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ABSTRACT

This is the fifth in a series of reports from the U. S. Metric Study, conducted by the National Bureau of Standards, designed to cover the nonmanufacturing segment of the economy representing about 65 percent of the total U. S. employment: mining, agriculture, forestry, fisheries, construction, transportation, communications, utilities, wholesale/retail trade, finance, insurance, real estate, and services. Over 2,300 telephone interviews were completed with key personnel in the organizations. Information was obtained concerning knowledge of the metric system, attitudes toward conversion, company outputs, company processes, hypothetical future use of metric measurement, and anticipated problems and benefits from conversion. For related documents, see SE 014 409, 014 411, 014 412, and 012 591. (JM)

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ED 065341

U.S. METRIC STUDY INTERIM REPORT

NONMANUFACTURING BUSINESSES

U.S. METRIC STUDY

U.S.
DEPARTMENT
OF
COMMERCE
National
Bureau
of
Standards
NBS SP 345-5

U.S. METRIC STUDY
INTERIM REPORT
NONMANUFACTURING BUSINESSES

Fifth in a series of reports prepared for the Congress

U.S. METRIC STUDY
Daniel V. De Simone, Director

National Bureau of Standards
Special Publication 345–5

by
June R. Cornog and Elaine D. Bunten

UNITED STATES DEPARTMENT OF COMMERCE
MAURICE H. STANS, *Secretary*
NATIONAL BUREAU OF STANDARDS
LEWIS M. BRANSCOMB, *Director*

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LETTER OF TRANSMITTAL

THE HONORABLE PRESIDENT OF THE SENATE
THE HONORABLE SPEAKER OF THE HOUSE OF
REPRESENTATIVES

SIRS:

I have the honor to present the fifth in the series of interim reports stemming from the U.S. Metric Study, prepared by the National Bureau of Standards.

This Study was authorized by Public Law 90–472 to reduce the many uncertainties concerning the metric issue and to provide a better basis upon which the Congress may evaluate and resolve it.

I shall make a final report to the Congress on this Study in August 1971. In the meantime, the data and opinions contained in this interim report are being evaluated by the Study team at the National Bureau of Standards. My final report to you will reflect this evaluation.

Respectfully submitted,

Maurice H. Stans
Secretary of Commerce

Enclosure

LETTER OF TRANSMITTAL

Honorable Maurice H. Stans
Secretary of Commerce

Dear Mr. Secretary:

I have the honor to transmit to you another interim report of the U.S. Metric Study, which is being conducted at the National Bureau of Standards at your request and in accordance with the Metric Study Act of 1968.

The Study is exploring the subjects assigned to it with great care. We have tried to reach every relevant sector of the society to elicit their views on the metric issue and their estimates of the costs and benefits called for in the Metric Study Act. Moreover, all of these sectors were given an opportunity to testify in the extensive series of Metric Study Conferences that were held last year.

On the basis of all that we have been able to learn from these conferences, as well as the numerous surveys and investigations, a final report will be made to you before August 1971 for your evaluation and decision as to any recommendations that you may wish to make to the Congress.

The attached interim report includes data and other opinions that are still being evaluated by us to determine their relationship and significance to all of the other information that has been elicited by the Study. All of these evaluations will be reflected in the final report.

Sincerely,

Lewis M. Branscomb

Lewis M. Branscomb, *Director*
National Bureau of Standards

Enclosure

FOREWORD

This report is based on a sample survey of U.S. nonmanufacturing businesses, ranging from agriculture to zoological gardens. Respondents were asked a wide variety of questions concerning Public Law 90–472, the Metric Study Act.

Reports covering the manufacturing industry and other aspects of the U.S. Metric Study are listed on the inside front cover. All of these, including this report, are under evaluation. They are published without prejudice to the comprehensive report on the entire U.S. Metric Study, which will be sent to the Congress by the Secretary of Commerce in August of 1971.

The Nonmanufacturing Survey was carried out by Miss Elaine D. Bunten under the direction of Dr. June R. Cornog, both of the Behavioral Sciences Section of the Technical Analysis Division in the National Bureau of Standards. Other members of the National Bureau of Standards staff who assisted in the preparation of the sample and other parts of the Survey were Dr. Howard E. Morgan, Mr. William O'Neal, Mrs. Lorraine Freeman, and Mrs. Diane Beall. The firm of Bickert, Browne and Coddington carried out the actual field interviewing.

We are grateful to the 2,563 businesses in the nonmanufacturing sample who contributed their time and knowledge to help make this report possible.

In this as in all aspects of the U.S. Metric Study, the program has benefited from the independent judgment and thoughtful counsel of its advisory panel and the many other organizations, groups, and committees that have participated in the Study.

Daniel V. De Simone, *Director*
U.S. Metric Study

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SUMMARY OF CONCLUSIONS

The essence of the findings from the survey of reactions among nonmanufacturing establishments in the United States towards possible national adoption of the metric system of measurement, is presented in the following conclusions. For full discussion see the appropriate sections of the report.

CONCLUSIONS

1. Accurate knowledge of metric system characteristics was not universal. About 75 percent of the respondent spokesmen answered questions on the basis of what may be considered to have been adequate background information; approximately 12 percent of these had *thorough* knowledge of metric measurement. Since people in general tend to fear what they do not fully understand, the general lack of acquaintance with the details of metric measurement may have resulted in over-estimation of the costs of conversion and the employee retraining needs.

2. There were few significant differences in opinion between companies grouped in three size categories. The largest organizations tended to be more favorable toward adoption of SI,[1] to feel a need for a longer changeover

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[1] The term "SI" stands for Système International, the current term and abbreviation for the international version of the metric system which would be adoped if the United States Congress decided to change the present system of measurement.

period, and to favor more often a mandatory national program of metrication established by legislative action, than smaller companies did.

3. A majority of the respondents in the nonmanufacturing survey foresaw no particular difficulty in converting to the metric system.

4. About 26 percent of the total sample was "against" increased metric usage within their own companies in case of a national metric changeover.

5. The retraining of labor was seen as the chief obstacle to conversion.

6. Organizations with export trade or foreign licensees or subsidiaries (11% of total sample) and those which were currently using metric-designed equipment or tools (17%) were significantly more often favorable towards national adoption of metric measurement than was the survey population at large.

7. The vast majority of the companies contacted saw no reason to change their system of measurement unless the whole U.S. does. Their chief reason for continuing their use of the present system was "tradition" but, even though they recognized the greater simplicity and ease of use of metric measurement, they had no intention of increasing their own use without the rest of at least their own industry.

8. Despite the statement of the majority, a small (6%) number of respondents declared their intention to begin using or to increase their use of SI within the next year or so. Their stated reasons for doing so were chiefly to "improve the quality" of their output, ease international commerce or meet foreign competition.

9. Being designed or fabricated to metric measurements or standards does not keep foreign produced goods from being widely sold in the United States, especially those items such as textiles, ceramics, glass, etc., which do not require mechanical servicing. Such goods are competitive in the U.S. with merchandise or services produced to U.S. measurements for domestic consumption.

10. The most satisfactory kind of metric goods in the U.S. economy are those which can be sold as units, i.e., equipment, tools or other items for which dimensions can be translated into U.S. equivalents and where close mechanical interface with equipment designed to U.S. engineering standards is not required.

11. Servicing of foreign produced metric items is the worst problem associated with their purchase and use in the U.S. but many foreign producers have set up or are now setting up their own servicing agencies in this country. The same difficulty, said the distribution industry, affects U.S. goods in other nations where the official measurement system is metric.

12. U.S. produced goods are at a particular disadvantage in countries which require that all imported merchandise conform to the official measurement system.

13. A majority of industry members expected *no* change in costs as a result of metrication. Of those who expected a change in costs, a majority, especially among the smaller organizations, anticipated a rise in costs of

operation about 0.5 percent a year for the duration of the changeover period. A majority did not expect to pass this cost on to the consumer.

14. Respondents with little or no personal knowledge of metric measurement anticipated the most problems and the highest costs in retraining company employees.

15. A national changeover period of from 6 to 10 years was considered satisfactory by most respondents, but individual industry conversion estimates were mostly for 5 years or less.

16. Sixty-one percent of all respondents thought that increased metric usage was in the best interests of the nation; a majority in all industries supported such a national change.

17. The majority (62%) favored a "mandatory national program of conversion, based on legislation." Large corporations were more often favorable to such a metrication policy than were small or medium organizations but each size class showed a majority in favor of a mandatory program.

18. The opinion was occasionally volunteered that the U.S. is already too late in undertaking the adoption of metric measurement, that every effort should be made to "catch up" with the rest of the world as soon as possible. No figures are available to show the breadth of this sentiment since no formal question was asked on this point.

SECTION I. Background

THE NEED FOR A NATIONAL STUDY

Interest in a possible change of the measurement system used in the United States is not new. Advocates of the metric system have worked over a period of nearly 170 years to introduce their preferred system of measurement into this country. In 1866 the Congress was persuaded to authorize use of the metric system, total changeover being deemed unnecessary and too expensive at that time.

Several events in recent years have stimulated renewed Congressional interest in the metric issue. With the exception of the United States, all other major countries using English units have within the last 5 years decided to abandon that system in favor of metric measurement. Other members of the British Commonwealth are following England's example—Australia and New Zealand are embarking on their conversion program and Canada declared in 1970 its intention to follow suit.

Before these recent events, the U.S. Congress, observing the trend of world events had, through Public Law 90–472, commissioned the Department of Commerce, and through it the National Bureau of Standards (NBS), to make a study of the benefits, estimated costs and problems involved in adopting increased usage of the metric system in this country. There have been over a dozen separate surveys and investigations in the metric study. The present report is concerned with the nonmanufacturing establishments and presents the results of a survey of a random sample of the approximately 11 million business, professional and other organizations in the nonmanufacturing population.

OBJECTIVES AND GENERAL METHODOLOGY

Other portions of the Metric Study obtained information relating to manufacturing firms, foreign trade, education, government agencies, consumers, engineering standards, commercial weights and measures, nationally representative associations, societies, unions and other groups. The study reported in this volume was designed to cover the remainder of the nonmanufacturing sectors of the economy, those described in the *Standard Industrial Classification Manual* [1] as:

Division A—Agriculture, Forestry, Fisheries
B—Mining
C—Contract Construction
E—Transportation; Communication; Electric, Gas and Sanitary Services;
F—Wholesale and Retail Trade
G—Finance, Insurance and Real Estate
H—Business and Personal Services

These industries include about 65 percent of the total U.S. employment and represent a wide variety of economic activities. Many of these industries produce and sell only services, some sell only goods and many sell both. This wide variation in the kinds of businesses included here made the use of a standard interviewing form difficult. In consequence, some compromises had to be made to obtain reasonably comparable results. This portion of the Metric Study does, however, give a broad perspective of the kinds of problems which might arise with metrication, based on opinions from people in many different kinds of economic activity. The only acknowledgement of variance in the activities of the sample population was the asking of a few more slightly differently phrased questions of sales- and service-oriented respondents than of those which were product-oriented.

Conversion to the metric system of measurement assumes different aspects for the nonmanufacturing groups than for those in the business of producing the goods. The manufacturer of mechanical equipment, for example, has face-to-face encounters every day with engineering standards and the need for precise measurements of his products. A measurement system is integral to the heart of his operation.

The nonmanufacturer, on the other hand, services, processes, trades in, or may only use the manufacturer's goods. As the servicer he will need tools that fit the product and replacement parts or components that can be fitted into place with minimal adjustment. As a trader or processor he may package the goods, put identifying labels on, pack them in certain sizes of boxes for shipment, describe boundaries, sell by weight, volume, temperature or thermal content, or change the shape, size or appearance of natural produce such as food or mineral extractions. As a user of goods he can choose to employ either U.S. or metric sized instruments or materials and still arrive at the same end of carrying out his own internal operations.

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[1] *Standard Industrial Classification Manual*, U.S. Bureau of the Budget, Washington, D.C.; Government Printing Office, 1967.

The user who employs products to render a service for others, such as the construction of a building or highway, is faced with the constraint of erecting or laying out his project either in the locally accepted measurement system or the one best understood and used by his workers. Some of his equipment will be insensitive to precise measurements—the earth moved by the bulldozers, the amount of concrete laid for a highway—but if window apertures are several millimeters different in size from standard steel frames for holding the glass, then adjustments must be made and extra costs are incurred. The nonmanufacturing industry does not often need measurements for fabrication but rather is faced with having to accommodate to what is produced by the manufacturers.

The data accumulated in the survey indicated that those industries which could control something about their product other than sheer number of units, were apparently adopting metric measurement in appreciable numbers. Because the Agricultural group must deal with the sizes nature produces and the Retail Trades handle only units produced by other organizations, the amount of metrication possible in these industry groups is mostly limited to the determination of sizes or weights for bulk shipments. Mining services and Construction have more option about measurements for goods or services exported and they seemed to be turning to the metric system in small but increasing proportions.

SOURCES AND METHODS OF DATA COLLECTION

Information was obtained from the nonmanufacturing industries through telephone interviews with key persons in 2563 business firms and nonprofit organizations. Letters requesting cooperation were sent in advance and two telephone calls were made, one call prior to sending descriptive literature about the metric system and one call after its receipt. Approximately 82 percent of the respondents were managers or owners of firms although some of these were not always as knowledgeable about the likely impact of metrication as others in the firm would have been. Cooperation was good—90 percent of the attempted interviews were completed.

A probability sample was drawn to permit estimates of sampling error to be derived. From the master file of approximately six million employers maintained by the Social Security Administration, a quota sample of firms, farms and nonprofit organizations was drawn to represent the nonmanufacturing sector of the economy. The sample was stratified by size of firm (based on number of employees) and industry group. Establishments surveyed in 86 industries were classified into 3 size categories to permit analysis of the impact of metrication on large versus small firms and among various industries.

A more detailed description of the source and methods of data collection appears in Appendix A.

REFUSAL RATE

Respondent refusal rate was exceptionally low—only 10 percent of those contacted declined to be interviewed and only 1 percent refused to go along with the second interview after having been asked the initial attitudinal questions in Phase I. Quality control of both interviewing and questionnaire completion was excellent. All interviewing was done under immediate supervision and where an answer was either omitted or unclear the respondent could be called again to obtain complete information. The validation that usually accompanies marketing research interviews was not necessary.

ORGANIZATION OF THIS REPORT

The questionnaire sought information in the following areas:

a. Knowledge of or about the metric system, attitudes toward increased national usage of metric measurement;
b. Company "outputs"—the products or services as a result of company activities;
c. Company "inputs"—the equipment and procedures used in conducting the organization business.
d. Hypothetical future use of metric measurement, the expected problems and benefits of conversion.

Data analysis follows the same general outline as that of the questionnaire.

In the text, significant analysis of the survey data is presented first with methodology descriptions being relegated to Appendices. The conclusions derived from the data analysis are given first, to accommodate the curious reader who has insufficient time to read the entire report.

Section I outlines the problem addressed by the survey and gives a brief sketch of the methodology employed in carrying out the survey. A more detailed description will be found in appendix A.

Section II offers a general discussion of the major findings with interpretations and a drawing together of the general themes of the inquiry. Not all of the findings are discussed in section II; for further and more succinct review of other relevant information, see appendix B where a summary prepared for one of the Advisory Panel meetings is reproduced.

Section III contains copies of the questionnaires, the key to easy location of particular information.

Section IV presents the detailed analysis and discussion of the data for each question or related group of questions. This material is keyed to the Question and Table numbers.

Appendix C contains the data tabulations in the computer printout form. Data have been analyzed in several ways:

a. By the sample as a whole;
b. By employer size class;
c. By 13 industry groupings;
d. By 7 industry divisions (for certain analyses only);
e. By annual gross dollar sales volume (for certain questions only);
f. By suggested lengths of metrication change-over period (for certain questions only);

These special interest groupings are more fully defined immediately following.

SPECIAL SUBSAMPLE GROUPS

Throughout the detailed discussions in the next section, data are presented in terms of the total sample population and, at times, in terms of specific subsample groups. These subsample groups have been selected on the presumption that their responses may be distinctive due to the occupational characteristics identifying the group.

TOTAL SAMPLE POPULATION. The total sample was made up of 2563 firms selected randomly in quotas from the entire list of nonmanufacturing firms in the Social Security Administration file. Main criteria were selection by size, based on number of employees, and industry type as identified by the 4–digit Standard Industrial Classification (SIC) number. (See appendix for complete discussion of sample selection.)

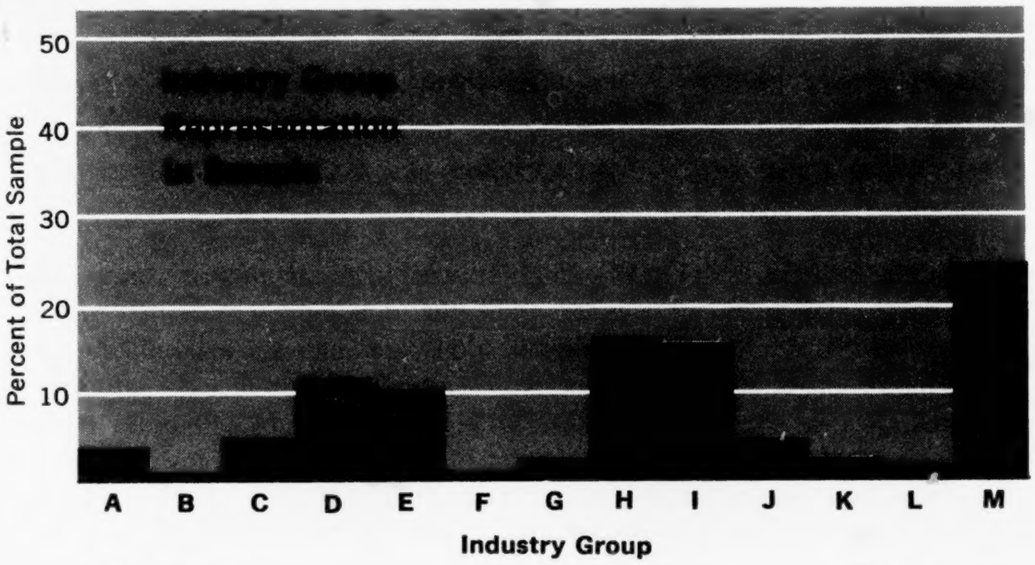
A. SIZE GROUPS. Responses to all questions were tabulated by organization size class: (1) firms with 1–19 employees, (2) firms with 20–249 employees, and (3) firms with 250 or more employees.

These 3 size classes do not actually correspond to "small," "medium," and "large" size designations in all industry groups. In the interest of brevity, however, many of the discussions use this terminology when presenting data based on breakdown by size. The text table (p. 10) shows the percentages of the total sample population made up by each size group. The fact that there was approximately equal representation in each group was an artifact of sample selection.

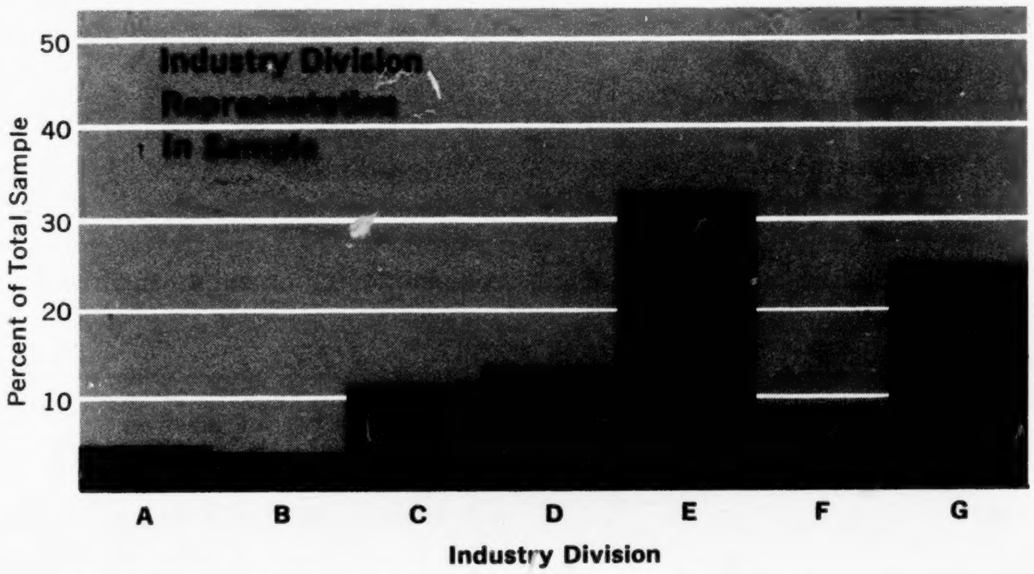
B. INDUSTRY GROUPS. Responses to nearly every question were tabulated by industry group using the 4-digit Standard Industrial Classifications. The percentages of firms selected from each industry correspond approximately to the actual proportions of employees within each industry. Therefore, the percentages shown in the graphs below are approximately representative of the nonmanufacturing industries in general. (See appendix for complete discussion of sample selection.)

INDUSTRY DIVISIONS. The 4-digit industry groups were also aggregated for some analyses into 7 industry divisions. The identification and distribution of responses by groups and divisions are shown on the following chart.

BREAKDOWNS OF TOTAL SAMPLE BY INDUSTRY GROUPS AND SIC DIVISIONS



A. Agriculture
B. Forestry / Fisheries
C. Mining
D. Construction
E. Transportation
F. Communications
G. Utilities
H. Wholesale Trade
I. Retail Trade
J. Finance
K. Insurance
L. Real Estate
M. Services



A. Agriculture / Forestry / Fisheries (Group A in Tables)
B. Mining
C. Construction
D. Transportation / Communication / Utilities (Group B in Tables)
E. Wholesale / Retail Trade (Group C in Tables)
F. Finance / Insurance / Real Estate (Group D in Tables)
G. Services

Number of employees							
1-19		20-249		250+		Total	
Number	Percent	Number	Percent	Number	Percent	Number	Percent
851	33.2	863	33.7	849	33.1	2,563	100

C. GROSS SALES: (Q. IV—25) It was believed that in some cases gross dollar sales would be a better indicator of company size than number of employees. Therefore, for some questions the data were tabulated by 4 categories of gross sales: (1) Under $1 million, (2) Over $1 million to $100 million, (3) Over $100 million to $1 billion, and (4) Over $1 billion. As the text table below shows, 9 percent of the total sample gave no answer when asked to indicate gross sales or gross dollar volume. These 9 percent were not included in the cross-tabulation.

Gross sales	Number	Percent total population
Under $1 million	1,042	41
Over $1 million-$100 million	996	39
Over $100 million-$1 billion	211	8
Over $1 billion	70	3
Don't know/Refused answer	244	9
Total	2,563	100

Gross sales are related to the size of company based on employment as the text table below shows:

Gross sales	Number of employees			
	1-19	20-249	250+	Total
Under $1 million	82%	37%	3%	41%
Over $1 million-$100 million	9	50	57	39
Over $100 million-$1 billion	0.5	1	23	8
Over $1 billion	0	0.1	8	3
Don't know/Refused	8	11	9	9
Total	100%	100%	100%	100%

The above breakdown is mainly of interest in singling out the very largest firms in terms of revenues. The two categories of "Over $100 Million to $1 Billion" and "Over $1 Billion" constitute 11 percent of the total number of firms in the survey and include the largest companies in the sample both in terms of number of employees and gross sales.

D. SUGGESTED CHANGEOVER TIME PERIOD: (Q. IV—8). Several questions in section IV of the questionnaire (Future Use of Measurement Systems) have been cross tabulated by the response to Q. IV—8: "Suggested time period for a nationally planned changeover to the metric system," as it was thought that the response to this question might be related to the attitudes or predictions stated in other questions.

Four intervals of suggested time periods were used:

Suggested time period	Percent total sample
Never	2
Within 5 years	29
6–10 years	42
More than 10 years	14
Total	87

The remaining 13 percent (321 firms) gave no answer to that question. These 321 firms are not included in the cross-tabulations.

E. EXPORTERS: ("YES" to Q. IIA—8). Nearly 12 percent of the sample stated that they exported to foreign countries. The responses from these 298 firms, because of their probably greater experience in dealing with 2 measurement systems, were analyzed separately for certain major questions. Almost two-thirds of the exporters had 250 or more employees.

Representation of Exporting Firms

Number of employees	Number	Percent exporters in total sample within that size class	Percent of all exporters
1–19	30	3.4	10.1
20–249	71	8.2	23.8
250+	197	23.2	66.1
Total	298	11.6	100

F. FIRMS HAVING FOREIGN LICENSEES OR SUBSIDIARIES: ("YES" to Qs. IIA—13 or IIB—8). Using the same rationale as for exporters, firms having foreign licensees/subsidiaries (291 firms or 11% of the total population) were also analyzed separately for certain major questions. Many more large than medium or small firms said they had foreign licensees/subsidiaries.

Number of employees	Number	Percent total sample having licensees/subsidiaries within that size class	Percent of all firms having licensees/subsidiaries
1-19	17	1.9	5.8
20-249	42	4.9	14.4
250+	232	27.3	79.7
Total	291	11.3	100

This subpopulation was closely related to the exporting group: 45 percent (N=130) of the firms that had licensees or subsidiaries were also exporters. G. USERS OF EQUIPMENT, SUPPLIES, OR COMPONENTS DESCRIBED IN METRIC UNITS OR DESIGNED TO METRIC STANDARDS: ("YES" to Q. III—1 or III—2). This special subgroup, all firms *currently using* metric goods or equipment in company inputs, was analyzed separately for certain major questions because of their presumably greater experience in using such articles, and their possibly better information about the impact of metrication. There was more nearly equal representation from all 3 size classes in this group than in the Exporting or Licensee/Subsidiaries groups; the largest firms again had greater representation, however.

Number of employees	Number	Percent total sample within that size class	Percent of all "Metric" users
1-19	112	13.2	25.2
20-249	136	15.8	30.6
250+	197	23.2	44.3
Total	445	17.4	100

H. LEVEL OF KNOWLEDGE OF THE METRIC SYSTEM: (Q. I—3). It was hypothesized that the level of knowledge of the company spokesman, (interviewers were instructed to seek out the best qualified spokesman on this topic), might be related to the company's general attitude toward metrication. Therefore, for certain major questions, responses were cross-tabulated with four "knowledge" groups based on answers given to question I–3 which was asked before respondents had received any explanations from NBS about the metric system.

Group I was made up of those who gave a full definition of the metric system: "An internationally used measurement system based on units of ten"; "A system using the meter as the unit of length, the kilogram as the unit of mass, the second as the unit of time, and the degree Celsius as the unit of temperature"; or some reasonable facsimile of these answers (12% total sample).

Group II was made up of those who gave a partial definition of the metric system: "A measurement system used in most European countries"; "A measurement system which uses meters and grams"; and other such explanations which are correct, but somewhat incomplete (61% total sample).

Group III was made up of those who gave incorrect answers: e.g., "A system using pounds and meters," "the measurement system used everywhere in the world"; etc. (4.5% total sample).

Group IV were those respondents who said they did not know what the metric system was (20% total sample).

Number of employees	Full		Definition of metric system					
			Partial		Incorrect		Don't know	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
1–19	74	24	450	29	45	39	251	49
20–249	87	28	526	34	36	31	189	37
250+	146	47	577	37	34	30	73	14
Total	307	100	1,553	100	115	100	513	100

There was a greater proportion of large companies than medium or small in both the "Full" and "Partial" definition groups. In the "Incorrect" and "Don't Know" definition groups there were greater proportions of small companies than medium or large.

SECTION II. General Discussion of Survey Findings

The order of discussion in this section generally follows the sequence of questions in the questionnaires.

KNOWLEDGE OF METRIC CHARACTERISTICS

Good knowledge of how the metric system works was not very widespread. Only about 12 percent of the sample gave thoroughly knowledgeable replies about the principles of the system, another 61 percent had some general information about how metric measurement is used and the remaining 27 percent either didn't know or didn't answer the question. This kind of fragmentary information base may have distorted answers to later specific questions about retraining programs, etc., although educational materials were sent to all respondents in between interviewing phases.

SOURCES OF METRIC INFORMATION

The sources of information about metric measurement were said to have been primarily school, newspapers and trade journals. The voice media, TV and radio, were hardly mentioned. This finding has strong implications for the most effective methods that may be used in reeducation of the public at large. All 3 of the media named above permit or require study of explanations presented.

It is of further interest to note that respondents with little or no personal knowledge of metric measurement anticipated the most problems and highest costs in retraining of their company employees.

DIFFERENCES IN RESPONSES BY ORGANIZATION SIZE

Differences of opinion between size classes of organizations were usually not significant although they have been pointed out in the detailed analysis when large enough to be worthy of note.

Variance in opinion by company size class seemed to be most significant in the areas of exports, presence of foreign licensees or subsidiaries and usage of metric-dimensioned equipment. Several times as many of the largest corporations were either engaged in foreign commerce, had licensees etc., as medium or small establishments had. Some of the small organizations had international interests but not on the scale of the larger corporations. Opinions presented for the exporting subgroup therefore represent all sizes of companies.

Large companies, having more ties with foreign commerce and often having licensees or subsidiaries abroad, more often used equipment either purchased from foreign suppliers and/or designed to metric standards.

COSTS AND BENEFITS OF METRICATION

A majority of firms said metrication would have *no* effect on annual dollar costs. Those who said costs would change generally said that the total cost of changeover to metric measurement would be less than 5 percent of 1 year's dollar costs of operation, with the expense being thought of as spread fairly evenly over the entire period of conversion. With a changeover program lasting 10 years, the cost per year, it was said, would average about 0.5 percent or less. The rewards for this effort were envisioned as easier measurement calculations, uniformity, "greater accuracy" and improved foreign trade. Only 11 percent of the total sample were engaged in foreign trade at the time of the survey.

The primary cost associated with change to SI would be neither for new equipment nor the temporary keeping of a dual inventory, but the expense of retraining the labor force, it was said. Many of the estimates of such cost were hard to believe, however, such as "It would cost more than the original training in how to carry out their jobs!" or "At least $1,000 per man, maybe more."

IMPORTS

The traditional U.S. "isolationism" manifested itself among a few respondents who implied, "The U.S. is its own best customer, our measurement system probably acts as a sort of pseudo tariff, presenting to some extent an otherwise uninhibited influx of foreign merchandise." Opinions from the majority contradicted this innuendo, however. Two-thirds of all the goods imported to the U.S. which were known to these respondents, were said to bear metric dimensions either as a result of having been manufactured on metric dimensioned machinery or because the goods themselves had been designed to metric engineering standards. For example, automobiles, calculating machines, electronics equipment, etc., are produced abroad on metric measurements and may be sold anywhere—those destined for sale in the U.S. are just certain lots that roll off the same assembly line that is used to produce units sold in Africa, Europe, etc. A few foreign companies, notably in Japan, do manufacture goods to U.S. dimensions for export to this country.

FOREIGN COMPETITION IN THE U.S.

Another interesting aspect of international trade manifested itself in the answers to the questionnaire—those U.S. industries in this survey which had the largest quantities of exports also said they had the most competition inside the U.S. from foreign imports. The rationale for this statement seems to have been that large processors or dealers handle goods that are the most widely sold. Just as they sell their goods in all the markets they can find, foreign producers of the same goods do likewise.

METRIC GOODS USAGE IN THE U.S.

A few U.S. establishments already produce goods designed to metric standards. Some of these items are intended for export to foreign countries, but slightly over half of those produced are sold to U.S. consumers who already use the metric system in company operations. About 17 percent of all firms surveyed were making some use of equipment, supplies or components, either described in metric units or designed to metric standards. The largest companies (21% of their group) more often used such equipment, etc., than smaller organizations. There were at least a few representatives in each of the thirteen industry groups which used metric items of some kind, most of them without conversion to U.S. measurements. Construction, Transportation, Utilities and the Wholesale Trades were the most frequent users of foreign produced goods.

METRIC EQUIPMENT IN THE U.S.

In the U.S. wherever organizations covered by the survey had bought one machine designed to metric standards for use in company operations, they tended to have purchased additional units of the same kind of equipment when replacements were necessary, until all equipments of one particular type were on the same measurement standard. This procedure apparently simplified maintenance problems and provided uniformity of operation. It also represented the effects of intrusion of metric-designed equipment into the domestic market.

DUAL DIMENSIONING

Which measurement system may have been used in fabricating items other than components or parts is usually of little concern to the consumer. If the size of individual units is important, as with clothing, for example, metric measures often can be readily translated to U.S. equivalents, and vice versa, while the basic dimensions remain unchanged. This kind of size translation is followed to some extent both for imports to the U.S. and for exports to those foreign countries which require that all imported goods be consistent with the measurement standards used in that nation.

FUTURE CONVERSION TO METRIC

A majority (51%) of the population of interest saw no particular difficulty in converting or adjusting to the metric system, although it should be mentioned that 74 percent of the nonmanufacturing sector of the economy was concerned with service activities while only 40 percent engaged in product oriented activities. When the 51 percent of nonopposers is added to the 26 percent who said they didn't know how the change might affect company operations, it appears that only 24 percent were really opposed to the introduction of a national change in the measurement system. This point is graphically illustrated in the histogram for table 115 on page 161.

ADVANTAGES TO POSSIBLE METRICATION

In general, metric measurement was seen as being easier to learn, easier to use and "more precise" than the U.S.-English system, as well as being an approach to world uniformity or standardization in measurement. All of the above advantages were concerned with the characteristics of the measurement system itself. There was a small group of respondents, about 5 percent of the total sample, mostly clustered in the Wholesale and Retail Trades, Transportation and Services, which said that metrication of the U.S. would also encourage international trade. As might be expected, companies already using some metric equipment tended to cite more advantages to SI than did those not employing metric items.

DISADVANTAGES TO POSSIBLE METRICATION

Changeover would present some problems for individual companies it was thought, such as difficulties with servicing, repair parts, a dual measurement system during the conversion period, dual inventories for parts, employees having to become fully conversant with quick methods for changing from one system to the other and the reeducating of the public. These disadvantages except the retraining of employees (14%) were mentioned by from 1 to 9 percent of the total population.

LENGTH OF POSSIBLE CONVERSION PERIOD

All respondents were asked to suggest first an optimum conversion period for the nation as a whole and, second, a reasonable changeover time for their own industry. The general consensus was for a 6 to 10-year period for the entire economy but all industry groups thought their own members could handily convert in less time than the nation could. About 49 percent specified 2 years or less as an optimum length of changeover time for their own industries. In eight industries—Finance, Insurance, Agriculture, Services, Real Estate, Forestry/Fisheries, Retail Trade, and Transportation—the largest percentage "voting" for any one time period, backed an "immediate" change to SI for their industries. The only industries in which the largest number of spokesmen specified 6 to 10 years were Utilities and Wholesale Trade.

A 10–YEAR PLANNED PROGRAM OF CHANGEOVER

The 10-year planned metrication program suggested in the following list of characteristics was seen as a possible hardship by only about 2 percent of the sample population. Approximately the same number of respondents steadfastly maintained that the U.S. should "never" change its present system of measurement.

THE CHARACTERISTICS OF A POSSIBLE PLANNED METRICATION PROGRAM

Along with their package of educational materials, all respondents received a list of "Hypothetical Characteristics of a Planned National Program to Increase Metric Usage in the U.S."

HYPOTHETICAL CHARACTERISTICS

1. All major countries except the U.S. are now metric.
2. There would be a nationally planned program in the United States to increase the use of the metric measurement system in this country.
3. The changeover to the metric system would be completed by the end of a designated time period.
4. Within the designated time period, all changes to metric language for printed materials such as signs, catalogs, deeds, and labels would be made only when such materials needed to be revised; and all

changes to metric sizes or engineering standards would be made only for new or redesigned parts or products.

5. Existing equipment would be used until the end of its normal life cycle; the only changes to metric units would be in dials, gages, and indicating devices.
6. You could establish your own schedule for conversion to metric language or standards, as long as these changes were accomplished within the designated time period.
7. All goods and services normally used by your organization would be available in metric terms as needed and at no extra cost to you. (To avoid the pyramiding of costs.)
8. The metric system would be taught in all U.S. schools during the transition period and the general public would be gaining familiarity with the metric measurement system at the same time.

The interviewer, after reminding the respondent of these assumptions, always added:

> "We've adopted those characteristics to find out how a nationally planned program *might* affect you. Let me emphasize that no program of this type actually exists. It's purely hypothetical."

ATTITUDES TOWARD INCREASED METRIC USAGE WITHIN OWN COMPANIES

After the eight national program characteristics had been recalled to respondents, thus presumably insuring that subsequent answers would be given in the light of those limitations, company spokesmen aligned themselves as follows:

	Percent of total
Strongly or mildly in favor of increased company usage of SI	30
Neutral	43
Strongly or mildly against increased company usage of SI	26

The class of smallest employers constituted the majority of strongly "for" or "against" change within their own companies. (See histograms for table 115 on page 161.)

INCREASED METRIC USAGE AND THE BEST NATIONAL INTEREST

Sixty–one percent of all respondents said that increased metric usage was in the best interest of the U.S.; majorities in *all* industries supported this position. Agriculture was least enthusiastic in its endorsement, Finance most enthusiastic. The opinions expressed by all industries on the national interest question are listed here and shown graphically in the histogram for table 116 on page 164.

Industry	Percent saying increased use of SI is "In best interests of U.S."	Industry	Percent saying increased use of SI is "In best interests of U.S."
Finance	71	Communication	60
Insurance	69	Utilities	59
Real Estate	66	Transportation	59
Services	64	Retail Trade	58
Mining	64	Construction	57
Forest/Fisheries	63	Agriculture	52
Wholesale Trade	63		

In the subgroups of exporters and present users of metric equipment/tools, 75 percent said increased usage was in the "best interests" of the U.S.

PREFERABLE COURSE OF ACTION IN POSSIBLE CONVERSION

Respondents were offered 3 alternatives for a possible national changeover. They selected among them as follows:

	Percent favoring
A mandatory program based on legislation	62
A coordinated national program based on voluntary participation	24
No national planned program; participation totally voluntary	8
Don't know/No answer	6

Large corporations (70%) were more often favorable toward a mandatory program than were small (57%) or medium (62%) size companies.

CRITIQUE OF STUDY RESULTS

SPOKESMEN. A consistent effort was made to obtain the most knowledgeable spokesman the organization afforded. In 82 percent of the cases this person was a relatively high level manager; in many companies it was the president himself. The remaining 18 percent of respondents were either technical personnel or technicians turned manager. The problem inherent in questioning largely managerial personnel became apparent in the answers given to the more technical questions—respondents often didn't know such things as whether equipments used in company operations were designed to metric or U.S. engineering standards, or whether imported goods had been made to metric measure or not. They did know about managerial data such as percentages of exports and imports, annual sales volume, etc. This ignorance of technical detail led to unusually large percentages of "don't know" answers for some questions.

KNOWLEDGE OF METRIC SYSTEM. About 25 percent of all company spokesmen were poorly acquainted with the characteristics of metric measurement when first questioned about organization attitudes twoard metrication. Educational materials remedied about 95 percent of this information gap but replies to some questions indicated that not all of these people had done their "homework" thoroughly. The problem then became, "Should all replies be counted anyhow?" The decision was made to count all responses but to point out *nonsequiturs* as these occurred.

NO EXACT COST FIGURES. Due to the extremely diverse nature of the industries in the nonmanufacturing universe, interview questions had to be phrased in general terms in order to be applicable to all respondents. It was important that only one set of questionnaires be used in order that information accumulated be comparable between industries. Because of the immense difficulty experienced in other efforts of the U.S. Metric Study to encourage firms, associations and other organizations to make special studies of probable costs of changeover to metric measurement, no exact cost figures were requested in the nonmanufacturing survey. Instead, only estimates of possible percentages of increase or decrease in annual operating costs were sought. Figures presented in this report, therefore, often have "ballpark" characteristics—they were the result of quick estimations, undoubtedly influenced by general company attitudes toward the whole metrication issue.

MUCH NEUTRALITY TOWARDS METRICATION. With an opinion bias influencing replies, the surveyer would normally expect to obtain exaggerated levels of antagonism to, or enthusiasm for, the entire metric issue. Such was not the case. The majority of spokesmen were either favorable or neutral in their expressions about possible national adoption of the metric system, but may have expressed their fears about unknown problems by exaggerating the cost estimates connected with changeover. It is believed that the strength of opinion about national adoption of metric measurement can be accepted at face value.

SECTION III. Questionnaires

RESPONDENT NUMBER ___ ___ ___ ___

OMB NO. 41-S70034

INITIAL CONTACT INTERVIEW

CLASSIFICATION DATA

SIC 4-Digit Code: __________

Name of SIC Industrial Group: ____________________

(RECORD NAME AND NUMBER OF 4-DIGIT GROUP IN THE APPROPRIATE SPACE AT THE END OF SECTION I.)

Name of Respondent: ____________________

Title of Respondent: ____________________ (Table 2)

Name of Organization: ____________________

City, State, ZIP CODE: ____________________ (Table 3)

Telephone (Area Code & Number): ____________________

Date Initial Contact Interview Completed: __________

Date Information Mailed: __________

Date Second Interview Completed: __________

(DO NOT READ ANSWERS TO RESPONDENT, UNLESS SPECIFIED IN THE INSTRUCTIONS. THE RESPONSE CATEGORIES WHICH ARE SUPPLIED ARE ONLY FOR YOUR CONVENIENCE IN RECORDING. QUESTIONS WHICH ARE PRECEDED BY * SHOULD BE ASKED OF ALL RESPONDENTS.)

INTRODUCTION

This is ______________ of the firm of Bickert, Browne, and Coddington. We're conducting a survey for the National Bureau of Standards as part of the U.S. Metric Study. I believe you received a letter recently from the Department of Commerce explaining the study. The purpose of the survey is to try to determine how much the Metric System is being used by industry. We also need to know whether companies foresee any increased use of the Metric System in the future.

The information we collect from this official call is very important, since the survey results will be reported to the Secretary of Commerce and the Congress. Therefore, we need to talk to the highest ranking company spokesman who is available.

The interview will be conducted entirely by telephone and has two phases. The first phase, which I would like to complete today if possible, generally lasts 3 to 5 minutes. The second interview should take about 20 to 30 minutes, depending on the scope and nature of your company's activities. This second phase will take place during a separate phone call a week to 10 days from now.

I'd like to ask you the few questions of Phase 1 now, if I may.

SECTION I. ATTITUDES AND LEVEL OF KNOWLEDGE

*1. Maybe you've heard talk going around lately that the United States might adopt the metric system of measurement. Have you heard anything about this? (Table 4)

1. ___ Yes 2. ___ No 3. ___ Don't know

IF YES TO Q. 1:

2. What have you heard? (Table 5)

___ READ "SOMETHING"

___ HEARD "SOMETHING"

___ READ ABOUT IT IN BUSINESS PUBLICATIONS

___ READ ABOUT IT IN NEWSPAPER

___ HEARD OR READ SOMETHING SPECIFIC (SPECIFY:)

___

___

___ OTHER (SPECIFY:) ___

___

*3. If one of your friends asked you what the metric system is, what would you tell him? (Table 6)
___

___

___

(IF RESPONDENT CAN GIVE NO ANSWER, OR ASKS FOR A DEFINITION, SAY:)

We will be sending you more information about the Metric System before my next call. Briefly, though, the Metric System is a measurement system based generally on the meter as the unit of length, the kilogram as the unit of mass, the second as the unit of time, the degree celsius as the unit of temperature, and units derived from these. It is the measurement system used in many parts of the world.

*4. Have you ever used the metric system yourself? (Table 7)

1. ___ Yes 2. ___ No 3. ___ Don't know

IF YES TO Q. 4:

5. In what way did you use it? (Table 8)

1. ____ SCHOOL
2. ____ WORK
3. ____ ARMED SERVICES
4. ____ FOREIGN TRAVEL
5. ____ HOBBY
6. ____ OTHER: (SPECIFY) ______________________

____

*6. Does the metric system have any advantages or disadvantages that you know of? (Table 9)

1. ___ Yes 2. ___ No 3. ___ Don't know

IF YES TO Q. 6:

6a. What are they?

ADVANTAGES: ______________________________ (Table 10)

____

____

____

DISADVANTAGES: ____________________________ (Table 11)

____

____

____

(IF RESPONDENT ANSWERED "DON'T KNOW" WHEN ASKED TO DEFINE THE METRIC SYSTEM IN Q. 3, DO NOT ASK Q. 7.)

7. How do you think it would affect your company if the United States decided to adopt the metric system? (Table 12)

____

____

____

(ONLY A BRIEF, GENERAL ANSWER IS WANTED. IF RESPONDENT GIVES A LONG, DETAILED ANSWER, TACTFULLY INTERRUPT.)

1. ____ NOT AT ALL
2. ____ JUST WOULD TAKE TIME TO GET USED TO IT
3. ____ SOME SPECIFIC ADVERSE EFFECTS
4. ____ SOME SPECIFIC BENEFICIAL EFFECTS
5. ____ OTHER (SPECIFY:) ____________________
____
9. ____ DON'T KNOW

That's all I really need to know today. In my next call, (Mr.) (Mrs.) ____________, we will be particularly interested in some detailed information on metric usage in your company.

Am I correct in recording your primary standard industrial classification as:

NAME OF SIC CATEGORY: ________________________

4-DIGIT SIC NUMBER: ________________

(IF CLASSIFICATION IS INCORRECT, DETERMINE RESPONDENT'S CORRECT PRIMARY SIC CLASSIFICATION AND RECORD IT ON THE FRONT OF THE QUESTIONNAIRE.)

Before I contact you again in a week or so, I will mail you some supplementary information about the metric system. The information is fairly brief, and it should help you to answer the second phase of questions. I would appreciate your reading through it before I call back.

When would be a convenient day and time for me to call you to conduct the second interview? If you'd prefer, it might be easier to conduct the next interview after business hours. I could call you at home some evening next week or even on Saturday, if that would be more convenient.

(IF HOME APPOINTMENT IS MADE:

HOME TELEPHONE NUMBER: ________________________________)

DATE OF SECOND APPOINTMENT

DAY: __________________________

DATE: _________________________

TIME: _________________________

Thank you again, (Mr.) (Mrs.) ____________________. I'll plan on talking to you again on _______________ at _________o'clock.

RESPONDENT NUMBER ___ ___ ___ ___

SECOND INTERVIEW

(II B)

(USE WITH THE FOLLOWING SIC CATEGORIES):

4-DIGIT NUMBER	SIC CATEGORY
40.. thru 47..	TRANSPORTATION
48..	COMMUNICATIONS
60.. thru 62.. & 67..	FINANCE
7... thru 8...	SERVICES
63..	INSURANCE
64.. thru 66..	REAL ESTATE

INTRODUCTION

(Mr.) (Mrs.) ____________? This is (INTERVIEWER) ______ of Bickert, Browne & Coddington and the U.S. Metric Study. I'm calling to complete the second phase of your interview. Have you had a chance to review the materials we sent you?

IF NO: Would it be possible to reschedule the second interview to give you more time to review that information?

When do you think that would be?

DATE: ____________________

TIME: ____________________

IF YES: Will you be able to complete the interview at this time?

(IF YES, CONTINUE WITH INTERVIEW)

(IF NO, RECORD NEW APPOINTMENT)

DATE: ____________________

TIME: ____________________

For this phase of questions, would you please answer the questions from your company's point of view, keeping in mind the principal industry group you are representing: (NAME OF 4-DIGIT SIC FROM PAGE 1 OF CONTACT INTERVIEW: ____________________. I'd like you to answer for your U.S. operations, unless foreign operations are specifically asked for in the question.

SECTION II. EXISTING MEASUREMENT SYSTEM: OUTPUT

*1. Could you please give me a brief run-down of your company's major activities? (Table 14)

____

____

____

____

____

____

*2. Do you quote any prices based on measurements such as length, area, or volume? (Table 15)

1. ___ Yes 2. ___ No 3. ___ Don't know

*3. How about quoting prices based on other measurements such as weight, temperature, or thermal content? (Table 16)

1. ___ Yes 2. ___ No 3. ___ Don't know

IF YES TO EITHER Q. 2 OR 3, ASK Q. 4-6.

IF NO TO BOTH Q. 2 & 3, SKIP TO Q. 7.

4. I'm going to read various measurement dimensions. Would you please tell me which measurement system - that is, U.S. or metric - you use to quote prices for each of these dimensions? (Tables 17-20)

(READ DIMENSIONS TO RESPONDENT AND RECORD IN THE APPROPRIATE BOX BELOW. IF RESPONDENT ANSWERS "BOTH", ASK:

For what percent would you estimate the metric system is used in quoting prices?

DIMENSION	U.S.	METRIC	BOTH	PERCENT METRIC
LENGTH OR AREA ____				
VOLUME ____				
WEIGHT ____				
TEMPERATURE ____				

5. Are there any engineering or size standards which you use in selling your services? (Table 21)

1. ___ Yes 2. ___ No 3. ___ Don't know

IF YES TO Q. 5, ASK Q. 5a & 5b:

5a. Could you name those standards? ____________________

____

____

5b. What measurement system (are those) (is that) standard(s) based on? (Table 22)

1. ___ U.S. 2. ___ Metric 3. ___ Other 4. ___ D.K.

6. Could you discuss for a moment the reasons why your company uses the measurement units or standards you just mentioned? (CHECK ONE OR MORE REASONS BELOW.) (Table 23)

___ TRADITION (ORIGIN UNKNOWN)

___ CUSTOMERS DEMAND IT

___ INDUSTRY AGREEMENT

___ TO MEET FOREIGN COMPETITION

___ OTHER (EXPLAIN) ____________________

___ OTHER (EXPLAIN) ____________________

___ DON'T KNOW

___ SUPPLIERS DETERMINE IT

___ LAW REQUIRES IT

___ TO MEET DOMESTIC COMPETITION

*7. Do you ever package any goods or products? (Table 24)

1. ___ Yes 2. ___ No 3. ___ Don't know

IF YES TO Q. 7:

7a. What measurement units are used to describe the container or package? First of all, for length or area? And volume? And weight? (Tables 25-27)

	U.S.	METRIC	DON'T KNOW
LENGTH OR AREA			
VOLUME			
WEIGHT			

*8. Does your organization have any licensee or subsidiary operations in foreign countries? (Table 28)

1. ___ Yes 2. ___ No 3. ___ Don't know

IF YES TO Q. 8, ASK Q. 9 - 11.

IF NO TO Q. 8, SKIP TO Q. 12.

9. What measurement system is used in your foreign operations? (Table 29)

1. ___ U.S. 2. ___ Metric 3. ___ Both 4. ___ D.K.

10. Why is that system used? ____________________ (Table 30)

____

____

____

11. Did measurement considerations influence your decision to operate a foreign licensee or subsidiary? (Table 31)

1. ___Yes 2. ___No 3. ___Don't know

IF YES TO Q. 11:

11a. How did measurement considerations influence your decision? (Table 32)

____

____

____

____

*12. In general, do you think the measurement units or standards used for foreign goods have affected the sales of these goods in the U.S.? (Table 33)

1. ___ Yes 2. ___ No 3. ___ Don't know

*12a. Why is that? ____________________ (Table 34)

____

____

____

OMB No. 41-S70034
Expiration Date 12/31/70

RESPONDENT NUMBER ___ ___ ___ ___

SECOND INTERVIEW

(II A)

(USE WITH THE FOLLOWING SIC CATEGORIES):

4-DIGIT NUMBER	SIC CATEGORY
0...	AGRICULTURE, FORESTRY, FISHERIES
10.. thru 14..	MINING
15.. thru 179.	CONSTRUCTION
49..	UTILITIES
50..	WHOLESALE
52.. thru 59..	RETAIL TRADE

INTRODUCTION

(Mr.) (Mrs.) __________? This is (INTERVIEWER) __________ of Bickert, Browne & Coddington and the U.S. Metric Study. I'm calling to complete the second phase of your interview. Have you had a chance to review the materials we sent you?

IF NO: Would it be possible to reschedule the second interview to give you more time to review that information?

When do you think that would be?

DATE: ______________________

TIME: ______________________

IF YES: Will you be able to complete the interview at this time?

(IF YES, CONTINUE WITH INTERVIEW)

(IF NO, RECORD NEW APPOINTMENT)

DATE: ______________________

TIME: ______________________

For this phase of questions, would you please answer the questions from your company's point of view, keeping in mind the principal industry group you are representing: (NAME OF 4-DIGIT SIC FROM PAGE 1 OF CONTACT INTERVIEW: ______________________. I'd like you to answer for your U.S. operations, unless foreign operations are specifically asked for in the question.

SECTION II. EXISTING MEASUREMENT SYSTEM: OUTPUT

*1. Could you please give me a brief run-down of your company's major activities? (Table 14)

____

____

____

____

____

____

(PROBE FOR PRINCIPAL CLASS OF PRODUCTS)

*2. Do you quote any prices based on measurements such as length, area, or volume? (Table 15)

1. ___ Yes 2. ___ No 3. ___ Don't know

*3. How about quoting prices based on other measurements such as weight, temperature, or thermal content? (Table 16)

1. ___ Yes 2. ___ No 3. ___ Don't know

*4. I'm going to read some measurement dimensions. Could you tell me which measurement system - that is, U.S. or metric - you use to describe each dimension when your product(s) (is) (are) sold?

(READ DIMENSION TO RESPONDENT AND RECORD IN THE APPROPRIATE BOX BELOW. IF RESPONDENT ANSWERS "BOTH", ASK:

For what percent would you estimate the metric system is used to describe your product(s)?

(Tables 17-20)

DIMENSION	U.S.	METRIC	BOTH	PERCENT METRIC
LENGTH OR AREA				
VOLUME				
WEIGHT				
TEMPERATURE				

*5. Are there any engineering or size standards which you use in selling your product(s)? (Table 21)

1. ___ Yes 2. ___ No 3. ___ Don't know

IF YES TO Q. 5, ASK Q. 5a & 5b:

5a. Could you name those standards? ______________

____

____

5b. What measurement system (are those) (is that) standard(s) based on? (Table 22)

1. ___ U.S. 2. ___ Metric 3. ___ Other 4. ___ D.K.

*6. Could you discuss for a moment the reasons why your company uses the measurement units or standards you just mentioned? (CHECK ONE OR MORE REASONS BELOW.) (Table 23)

___ TRADITION (ORIGIN UNKNOWN)

___ CUSTOMERS DEMAND IT

___ INDUSTRY AGREEMENT

___ TO MEET FOREIGN COMPETITION

___ TO IMPROVE QUALITY OR PERFORMANCE

___ OTHER (EXPLAIN) ______________________________

___ OTHER (EXPLAIN) ______________________________

___ DON'T KNOW

___ SUPPLIERS DETERMINE IT

___ LAW REQUIRES IT

___ TO MEET DOMESTIC COMPETITION

*7. Do you ever package any goods or products? (Table 24)

1. ___ Yes 2. ___ No 3. ___ Don't know

IF YES TO Q. 7:

7a. What measurement units are used to describe the container or package? First of all, for length or area? And volume? And weight?

	U.S.	METRIC	DON'T KNOW
LENGTH OR AREA			
VOLUME			
WEIGHT			

(Tables 25-27)

*8. Does your organization ever export any U.S. products to foreign countries? (Table 35)

1. ___ Yes 2. ___ No 3. ___ Don't know

IF YES TO Q. 8, ASK Q. 9 - 12.

IF NO TO Q. 8, SKIP TO Q. 13.

9. When you export products, do you describe those products with the same measurement units you use for U.S. sales? (Table 36)

1. ___ Yes 2. ___ No 3. ___ Sometimes 4. ___ D.K.

IF "NO" OR "SOMETIMES" TO Q. 9:

9a. Does this change present any problems? (Table 37)

____

____

____

____

10. How about engineering standards, are they the same as for U.S. sales? (Table 38)

1. ___ Yes 2. ___ No 3. ___ Sometimes 4. ___ D.K.

IF "NO" OR "SOMETIMES" TO Q. 10:

10a. Is there ever a problem for you? ___________ (Table 39)

____

____

____

11. Do you feel that the volume of your export sales ever depends on the measurement units you use? (Table 40)

1. ___ Yes 2. ___ No 3. ___ Don't know

IF YES TO Q. 11:

11a. To what extent? ______________________ (Table 41)

____

____

12. How about engineering standards, do you feel that the volume of your export sales ever depends on the engineering standards you use? (Table 42)

1. ___ Yes 2. ___ No 3. ___ Don't know

IF YES TO Q. 12:

12a. To what extent? ______________________ (Table 43)

____

____

____

*13. Does your organization have any licensee or subsidiary operations in foreign countries? (Table 28)

1. ___ Yes 2. ___ No 3. ___ Don't know

IF YES TO Q. 13, ASK Q. 14 - 16.

IF NO TO Q. 13, SKIP TO Q. 17.

14. What measurement system is used in your foreign operations? (Table 29)

1. ___ U.S. 2. ___ Metric 3. ___ Both 4. ___ D.K.

15. Why is that system used? ______________________________ (Table 30)

____

____

____

16. Did measurement systems influence your decision to operate a foreign licensee or subsidiary? (Table 31)

1. ___ Yes 2. ___ No 3. ___ Don't know

IF YES TO Q. 16:

16a. How did measurement considerations influence your decision? (Table 32)

____

____

____

____

____

* 17. To your knowledge, are the products that you sell in the U.S. also imported to this country by foreign firms? (Table 44)

1. ___ Yes 2. ___ No 3. ___ Don't know

IF YES TO Q. 17:

17a. Are the measurement units or standards for these foreign products different from the ones used in your U.S. sales? (Table 45)

1. ___ Yes 2. ___ No 3. ___ Sometimes 4. ___DK

*18. In general, do you think the measurement units or standards used for foreign goods have affected the sales of these goods in the U.S? (Table 33)

1. ___ Yes 2. ___ No 3. ___ Don't know

*19. Why is that? ____ (Table 34)

____

____

____

RESPONDENT NUMBER ___ ___ ___ ___

SECTION III. EXISTING MEASUREMENT SYSTEM: INPUT

*1. Does your organization make any significant use of equipment, supplies, components or tools which are described in metric units? (Tables 46-58)

1. ___ Yes 2. ___ No 3. ___ Don't know

IF YES, ASK Q. 1a - 1d:

1a. Can you list for me those articles which are described in metric units?

(RECORD EACH GENERAL CATEGORY OF METRIC ARTICLE IN COLUMN A BELOW.)

	A. METRIC ARTICLES	B. % METRIC	C. DUAL
1.			
2.			
3.			
4.			
5.			
6.			

(FOR EACH GENERAL CATEGORY OF "METRIC ARTICLE" RECORDED IN Q. 1a, ASK Q. 1b - 1d.)

1b. About what perecnt of your total (METRIC ARTICLES) are described in metric units?

(RECORD IN COLUMN B ABOVE.)

1c. Are those (supplies) (components) (equipment) (tools) you mentioned described in metric units only, or is there dual dimensioning?

1. ___ Metric only 2. ___ Dual 3. ___ Don't know

1d. Which of them have dual dimensioning?

(RECORD IN COLUMN C OF CHART ABOVE)

(Tables 59-71)

*2. Now I'd like to ask about engineering standards. Does your organization make any significant use of equipment, supplies, components or tools which are designed to metric engineering standards?

1. ___ Yes 2. ___ No 3. ___ Don't know

IF YES TO Q. 2, ASK Q. 2a - 2d:

2a. Which articles are designed to metric engineering standards?

(RECORD EACH GENERAL CATEGORY OF ARTICLE IN COLUMN A BELOW.)

	A. METRIC ARTICLES	B. % METRIC	C. DUAL
1.			
2.			
3.			
4.			
5.			
6.			

(FOR EACH GENERAL CATEGORY OF "METRIC ARTICLE" RECORDED IN Q. 2a, ASK Q. 2b - 2d.)

2b. About what percent of your total (METRIC ARTICLE) are designed to metric standards?

(RECORD IN COLUMN B ABOVE.)

2c. Are those (supplies) (components) (equipment) (tools) which you mentioned designed to strictly metric standards, or is there dual dimensioning?

1. ___ Metric only 2. ___ Dual 3. ___ Don't know

2d. Which of them has dual dimensioning?

(RECORD IN COLUMN C OF CHART ABOVE.)

IF "YES" TO EITHER Q. 1 OR 2, ASK Q. 3 - 5.

IF "NO" TO BOTH Q. AND 2, SKIP TO Q. 6.

3. Were the metric articles you mentioned manufactured in the U.S. or in a foreign country? (Table 72)

1. ___ U.S. 2. ___ Foreign 3. ___ Both 4. ___ D.K.

IF "BOTH" TO Q. 3:

3a. Could you please estimate what percent were manufactured in a foreign country? (Table 73)

PERCENT FOREIGN MADE: ________

4. Has your company found any particular advantages in using metric goods or equipment? (Table 74)

ADVANTAGES: ________________________________

5. How about any disadvantages or problems associated with such metric goods or equipment? (Table 75)

DISADVANTAGES: ________________________________

*6. Which of the following phrases best describes how important measurements and measurement calculations are to your overall company operations? (READ CHOICES TO RESPONDENT.) (Table 76)

1. ___ VERY IMPORTANT
2. ___ MODERATELY IMPORTANT
3. ___ RELATIVELY UNIMPORTANT
4. ___ NOT AT ALL IMPORTANT

*7. If you think of the total man-hours in your organization that are devoted to making measurements or measurement calculations, about what percent of this total would you estimate is spent using the metric measurement system? (Table 77)

PERCENT METRIC ___________

RESPONDENT NUMBER ___ ___ ___ ___

SECTION IV. FUTURE MEASUREMENT

In the next group of questions I'd like your opinions about your possible future use of the metric system in this country. Some of the questions will ask for predictions, and I realize that some of your answers can only be rough estimates. But please try to estimate as accurately as you can. Again, I'd like you to answer for your company in the United States, unless foreign operations are specifically mentioned.

In the first set of questions, consider only the trends in your (company's) (organization's) operations as they now exist. We want to know what you think will happen to the use of measurement systems in this country, if the existing trends are allowed to follow their natural course. In other words, what will happen if there is no national program to adopt the metric system, and each company is allowed to use whichever measurement system is best for its purposes.

*1. Do you think that your organization will ever use or increase its use of metric measurements on its own? (Table 78)

1. ___ Yes 2. ___ No 3. ___ Not unless whole U.S. does 4. ___DK

*1a. Why is that? (CHECK ONE OR MORE RESPONSES BELOW.) (Table 79)

(IF "YES")

___ TO FACILITATE INTERNATIONAL COMMERCE

___ TO IMPROVE QUALITY OR PERFORMANCE

___ INDUSTRY AGREEMENT

___ TO MEET FOREIGN COMPETITION

___ OTHER: ____________________

____

___ OTHER: ____________________

____

___ DON'T KNOW

(IF "NO" OR CONDITIONAL)

___ NO NEED

___ TOO EXPENSIVE

___ INDUSTRY AGREEMENT

___ NO CUSTOMER DEMAND

___ NO FOREIGN COMMERCE

___ SUPPLIERS DETERMINE IT

___ LAW REQUIRES U.S. SYSTEM

___ INTEGRATED; CANNOT CHANGE ALONE

___ OTHER: ____________________

____

___ DON'T KNOW

IF YES TO Q. 1, ASK Q. 2 - 4:

IF NO TO Q. 1, SKIP TO Q. 5.

2. When do you think you might begin to make changes in your present measurement system on your own? (Table 80)

NUMBER OF YEARS: ______ DON'T KNOW ___

3. What do you suppose will be some of the advantages of increasing metric usage? (Table 81)

4. How about disadvantages? (Table 82)

*5. Let's suppose that the firms from which you buy supplies, equipment, tools, or components increased their use of metric measures or standards on their own. What effect would that have on your (company) (organization)? (Table 83)

*6. Do you think your company would face any inventory problems if some industries went metric on their own while others continued to use the U.S. system? (Table 84)

1. ___ Yes 2. ___ No 3. ___ Don't know

IF YES TO Q. 6:

6a. What would be the nature and extent of those inventory problems? (Table 85)

___

___

___

___

*7. Do you think that the government should take any action to bring about changes in the use of metric units or standards in this country? (Table 86)

1. ___ Yes 2. ___ No 3. ___ Don't know

IF YES TO Q. 7:

7a. What sort of action should be taken to bring about these changes? (Table 87)

___ A COORDINATED, VOLUNTARY NATIONAL PROGRAM

___ A COORDINATED NATIONAL PROGRAM WITH CERTAIN CHANGES MANDATORY

___ A NATIONAL EDUCATIONAL PROGRAM

___ OTHER (SPECIFY): ___

___

___ OTHER (SPECIFY): ___

___

___ DON'T KNOW

While you are answering the next questions I'd like you to think in terms of a nationally planned program to increase the use of the metric system in this country. We've set up a list of hypothetical characteristics of such a national program, so that each respondent can answer in terms of the same plan.

Since our last conversation, you've received some materials from us which include a list of those hypothetical program characteristics. I'd like to review those characteristics with you now. Do you have that list handy.

(READ ALL EIGHT CHARACTERISTICS TO THE RESPONDENT, EVEN IF HE STATES THAT HE HAS READ THE LIST.)

CHARACTERISTICS

1. All major countries except the U.S. are now metric.
2. There would be a nationally planned program in the United States to increase the use of the metric measurement system in this country.
3. The changeover to the metric system would be completed by the end of a designated time period.
4. Within the designated time period, all changes to metric language for printed materials such as signs, catalogues, deeds, and labels would be made only when such materials needed to be revised; and all changes to metric sizes or engineering standards would be made only for new or redesigned parts or products.
5. Existing equipment would be used until the end of its normal life cycle; the only changes to metric units would be in dials, gauges, and indicating devices.
6. You could establish your own schedule for conversion to metric language or standards, as long as these changes were accomplished within the designated time period.
7. All goods and services normally used by your organization would be available in metric terms as needed and at no extra cost to you.
8. The metric system would be taught in all U.S. schools during the transition period and the general public would be gaining familiarity with the metric measurement system at the same time.

We've adopted those characteristics to find out how a nationally planned program might affect you. Let me emphasize that no program of this type actually exists. It's purely hypothetical.

Before we continue, do you have any questions about the characteristics?

*8. Suppose that you were going to help develop a national plan for adopting the metric system in this country. What kind of time period do you think would be reasonable for making the changeover? (Table 88)

___ NEVER

___ IMMEDIATELY

___ NUMBER OF YEARS

___ DON'T KNOW

(KEEP THIS NUMBER OF YEARS IN MIND IN OBTAINING ANSWERS TO Q. 10 - 12a.)

*9. How about a plan for a changeover for your own industry; what time period do you think would be reasonable? (Table 89)

___ NEVER

___ IMMEDIATELY

___ NUMBER OF YEARS

___ DON'T KNOW

*10. Suppose a national plan were developed so that the whole United States would be metric by the end of a (NO. OF YEARS IN Q. 8) year time period. What would be the biggest advantage to your organization of this planned (NO. OF YEARS) - year changeover? (Table 90)

*11. What would be the biggest disadvantages? ____________________ (Table 91)

____

____

____

*12. How about your competition? Would this planned (NO. OF YEARS)-year metric changeover have any effect on your competitive position among your chief U.S. competitors? (Table 92)

1. ___ Yes 2. ___ No 3. ___ Don't know

IF YES TO Q. 12:

12a. What effect would it have? ____________________ (Table 93)

____

____

____

(IF TIME PERIOD MENTIONED IN Q. 8 WAS EXACTLY TEN YEARS, SKIP TO Q. 17.)

13. What if the national plan for changeover were a 10-year period? If you use the same characteristics on your list, would it change any of the answers you gave to the (NO. OF YEARS GIVEN TO Q. 8) - year period? (Table 118)

1. ___ Yes 2. ___ No (PROBE)

IF YES TO Q. 13, ASK Q. 14 - 16.

IF NO TO Q. 13, SKIP TO Q. 17.

14. What would be the biggest advantage to your organization of this 10-year planned changeover? (Table 94)

____

____

____

____

15. And what would be the biggest disadvantages? (Table 95)

____

____

____

____

16. Would this 10-year planned metric changeover have any effect on your competitive position with your chief U.S. competitors? (Table 96)

1. ___ Yes 2. ___ No 3. ___ Don't know

IF YES TO Q. 16:

16a. What effect would it have? ____________________ (Table 97)

____

____

____

____

*17. Keeping in mind the eight program characteristics, do you think that a national 10-year planned changeover would influence your annual dollar sales? (Table 98)

1. ___ Yes 2. ___ No 3. ___ Don't know

IF YES TO Q. 17, ASK Q. 17a & 17b:

IF NO TO Q. 18, SKIP TO Q. 18.

17a. What do you think the percent change in your annual U.S. dollar sales might be? (Table 99)

(BE SURE THAT THE RESPONDENT INDICATES THE DIRECTION OF CHANGE; i.e., POSITIVE OR NEGATIVE.)

1. ___ + % 2. ___ - % 3. ___ Don't know

17b. How about the percent change in your annual dollar export sales? (Table 100)

1. ___ + % 2. ___ - % 3. ___ Don't know

*18. Let's talk about costs now. Do you think a nationally planned 10-year changeover would have any effect on your annual dollar costs? (Table 101)

1. ___ Yes 2. ___ No 3. ___ Don't know

IF YES TO Q. 18, ASK Q. 18a - 18c.

IF NO TO Q. 18, SKIP TO Q. 19.

18a. Could you estimate the percent change in terms of your annual costs? (Table 102)

1. ___ + % 2. ___ - % 3. ___ Don't know

18b. About how long would you expect this change in costs to affect your operation? (Table 103)

___ YEARS ___ MONTHS ___ DON'T KNOW

18c. Which of the following would you estimate to be the most important factor in your (increase) (decrease) in costs? (Table 104)

(READ CHOICES TO RESPONDENT.)

___ LABOR

___ EQUIPMENT

___ COMPONENTS

___ INVENTORY

___ OTHER (ASK FOR EXPLANATION) ____________________

____

____

___ DON'T KNOW

*19. Would such a changeover affect your selling price? (Table 105)

1. ___ Yes 2. ___ No 3. ___ Don't know

(IF RESPONDENT ASKS OR EXPRESSES CONFUSION, EXPLAIN:

What we need to know here are changes in the actual costs to your customers, not simple changes in cost because an article is sold in larger or smaller units.)

IF YES TO Q. 19:

19a. About what percent increase or decrease in unit price might you expect? (Table 106)

1. ___ + % 2. ___ - % 3. ___ Don't know

*20. Would any of your employees have to be retrained if the United States were to go metric? (Table 107)

1. ___ Yes 2. ___ No 3. ___ Don't know

IF YES TO Q. 20, ASK Q. 21 - 23a.

IF NO TO Q. 20, SKIP TO Q. 24.

21. About what percent would have to be retrained? (Table 108)

_____% ___ Don't know

22. What do you think it might cost your company on the average to retrain an employee? (Table 109)

$_________ ___ Don't know

23. How does this compare with the costs for originally training an employee? (Tables 110 and 111)

____

____

(TRY TO OBTAIN APPROXIMATE COSTS FOR ORIGINAL TRAINING.)

IF THE ANSWERS TO Q. 22 & 23 ARE OF EQUAL SIZE:

23a. Then you think that it would require just as long to retrain your personnel in the new system of measurement as it took to teach them their job skills in the beginning? (Table 112)

1. ___ Yes 2. ___ No 3. ___ Don't know

We need to know the answers to the next two questions, so that we may get the most up-to-date information about the size of your organization. This information will be kept completely confidential.

*24. How many persons are employed in your organization on the average? (Table 113)

01 ___ Less than 10
02 ___ 10 to 19
03 ___ 20 to 49
04 ___ 50 to 99
05 ___ 100 to 249
06 ___ 250 to 499
07 ___ 500 to 999
08 ___ 1,000 to 2,499
09 ___ 2,500 to 10,000
10 ___ Over 10,000

*25. What were your approximate gross sales or gross dollar volume for the 1969 business year? (Table 114)

$ ____________

(IF RESPONDENT HESITATES, READ THE EXAMPLES OF DOLLAR RANGES LISTED BELOW WHICH YOU FEEL ARE NEAR TO HIS ACTUAL DOLLAR RANGE.)

01 ___ Up to $50 thousand
02 ___ Over $50T to $100T
03 ___ Over $100T to $500T
04 ___ Over $500T to $1 M
05 ___ Over $1M to $5M
06 ___ Over $5M to $10M
07 ___ Over $10M to $25M
08 ___ Over $25M to $50M
09 ___ Over $50M to $100M
10 ___ Over $100M to $250M
11 ___ Over $250M to $500M
12 ___ Over $500M to $1B
13 ___ Over $1 billion

Finally, I'd like to ask just three more broad questions about your company's overall feeling regarding the use of the metric system in this country. They may appear to be repetitive, but we need your candid opinion.

*26. Which of the following choices most closely indicates the current attitude of your company toward increased metric usage in your operations? (Table 115)

(READ CHOICES TO RESPONDENT.)

1. ___ STRONGLY FOR
2. ___ MILDLY FOR
3. ___ NEUTRAL
4. ___ MILDLY AGAINST
5. ___ STRONGLY AGAINST

*27. Do you believe that increased metric usage is in the best interests of the United States? (Table 116)

1. ___ Yes 2. ___ No 3. ___ Don't know

*28. If it is found that metric usage is in the best interests of the United States, which of the following courses of action, in your opinion, is preferable? (Table 117)

(READ CHOICES TO RESPONDENT.)

1. ___ A MANDATORY PROGRAM BASED ON LEGISLATION
2. ___ A COORDINATED NATIONAL PROGRAM BASED ON VOLUNTARY PARTICIPATION
3. ___ NO NATIONAL PLANNED PROGRAM; PARTICIPATION WOULD BE TOTALLY VOLUNTARY
4. ___ DON'T KNOW

Thank you very much. We appreciate the time you have given in helping us with this study.

SECTION IV. Detailed Discussion of Tables for All Questions

The section immediately following, contains a detailed analysis of the tables for each question in the questionnaire. Some notes about the reading of this material may be helpful.

Percentages quoted have been rounded to the nearest whole number except a few of less than 2 percent. Decimal places with percentage figures tend to lead the reader to regard the findings as being more exact than they probably are. All percentages should be read with a Standard Error in mind of ± about 2 to 3 percent. The rounding of data statistics hopefully will keep the reader reminded of a possible margin of error.

Text tables present only the highlights or most impressive information from the full tables contained in appendix C. The purpose of the discussion is to present the data as the analyst interprets their meaning and to lead the reader to consult the original tabular results so he may compare his own interpretation with that made by the investigators. Data are presented briefly in the text tables to emphasize particular points or to show up special contrasts. Complete information is given only when the question was of particular significance.

Several special interest groups are occasionally singled out for detailed analysis. For definition of: present metric users, exporters, companies with foreign licensees and subsidiaries and others, see last pages of section II.

Data for all questions are presented in at least two tables in the appendix. The A tables present the data tabulated by company size class and, in cases where the number of respondents answering a question was dependent on how they had replied to a previous query, the sample may have been the total population of 2563 or may have been some fragment of that number. Where subgroups with special interests are singled out for analysis, the A table will use as a base for calculation of percentages, only the number of respondents with those particular interests, e.g., only exporters, only those expecting to have to retrain employees in case of national metrication, etc.

B tables are nearly always based on the total population and present the data by industry group. Percentages shown indicate the proportions of representatives within each industry who stated certain views.

Tables C and D, where they have been formulated, show the same data by the time originally suggested by respondents as "reasonable" for a national changeover to SI and by size of company according to volume of annual gross dollar sales.

In answering questions 13 through 16a in section IV of the questionnaire, respondents seemed unable to discriminate between the import of these items and the information requested in items IV, 9–11. Tables and data for questions 13—16a are therefore not presented.

Reference tables are listed at the top of the first page for each question analysis. Probably the best way to locate a particular bit of information quickly is to consult the questionnaires, find the section and question number for the item which elicited the information desired and then locate the detailed analysis by means of those key numbers. Appendix C table numbers are also listed on the questionnaires for each question.

The initials "DK" occasionally used in text tables stand for "Don't Know."

TABLES 2A & B

Organization Respondent's Title

Initial contact with a respondent firm was most often accomplished by first having the interviewer call the office of the president or other top executive of the company. After explaining the purpose of the survey, he (often she) asked to be referred to a person in the organization who would be most likely to give knowledgeable answers about the use of measurement in company operations. In about 82 percent of the contacts, the interviewer was referred to a high-level managerial employee. Almost the same proportion of managers answered the questionnaire for companies in all three size categories. Persons in technical or managerial-technical positions were designated as corporate spokesmen, each in about 5 percent of the interviews. Technically-oriented personnel most often represented their organizations in the Forestry/Fisheries, Mining and Communications industries (10–12% each).

TABLES 3A & B

Geographical Locations of Respondents

Respondent companies were chosen at random from the Social Security Administration listings of all organizations within the same SIC number. Industry representation, not geographical location, was the chief consideration in drawing the sample. As a result of this approach, the largest representations were drawn from the most populous states. The only state in which no interviews were carried out was Hawaii. In most states the proportion of interviews was quite equally divided amongst the three size categories of organizations. Only in New York state was there a considerably larger representation in the "250 or more" employees category than in the two smaller classes. A partial table of the distribution of interviews by size of firm in the seven most heavily represented states will give a good idea of the geographical distribution of the survey coverage:

	Number of employees			
	1 to 19	20 to 249	250+	Total
	Percent	*Percent*	*Percent*	*Percent*
New York	[1] 8.8	[1] 10.3	[1] 17.3	12.1
California	11.2	12.3	12.5	12.0
Texas	8.5	8.1	7.2	7.9
Pennsylvania	4.1	4.9	6.7	5.2
Illinois	4.4	4.3	6.8	5.2
New Jersey	2.5	5.3	4.0	3.9
Massachusetts	3.3	3.2	4.1	3.6

[1] Percent of total sample in that size class.

Not all states had respondents in all industry categories, but it is believed that representation was equitably distributed. Quotas by industry were based on data taken from *County Business Patterns.*

This method of deriving sample sizes led to one quota worthy of mention here—the number of interviews taken in the agricultural production industry in California. The unexpectedly large total percentage for this state was due primarily to the type of farms located in that area. Since the number of employees was used as the basis for size definition, the respondent firms selected were largely determined by the kinds of crops grown and the number of laborers hired to tend them. Crops grown in California (i.e., fruits, vegetables) require a much larger proportion of human labor than does the grain grown in the Midwest, for example.

TABLES 4A & B

Q. I–1 Maybe you have heard talk going around lately that the United States might adopt the metric system of measurement. Have you heard anything about this?

Seventy–six percent of the population surveyed had heard something about the possibility that the U.S. might adopt the metric system of measurement.

More large companies (87%) had heard of it than small ones (68%). The least knowledgeable industry was Agriculture (59% of their own group said they had heard something) while the most well informed were those in the Utilities industry (87%). A small text table will compare the proportions of knowledgeability claimed by representatives in the various industries:

	Percent having heard of possible adoption		*Percent having heard of possible adoption*
Utilities	87	Mining	75
Wholesale Trade	85	Construction	73
Real Estate	84	Services	73
Communication	84	Transportation	69
Insurance	79	Forestry/Fisheries	68
Finance	76	Agriculture	59
Retail Trade	76		

These figures are quoted at this length because they will be of some help in interpreting the positions taken by these industries in their answers to later questions.

Conclusion: The idea of conversion to the metric system was not new—questions about it came as no surprise to 76 per cent of the population of interest.

TABLES 5A & B

Q. I–2 (If you have heard of possible conversion to metric system,) what have you heard?

Of those who said they had had some earlier knowledge of possible conversion to the metric system, the largest group (45%) had little recollection for the source of what they had "heard." Those who said they had "read" something (33%) were most likely to have seen it in a business or trade magazine (17%) or in the newspaper (24%). Television and radio were hardly mentioned as media for obtaining information of this kind. Spokesmen for small companies were more likely to have "heard" something (52%) than large company respondents (41%). Company spokesmen for middle-sized firms were least likely to have "read" anything (30% compared to 36% for large company men). Only in the Forestry and Fisheries industry did more respondents claim to have "read" than to have "heard" something about conversion to the metric system.

TABLES 6A & B

Q. I–3 If one of your friends asked you what the metric system is, what would you tell him?

This question was intended to help the surveyors assess the level of the respondent's personal *knowledge* of the metric system. Explanations were then classified as shown below. A glance at the figures will reveal that large company spokesmen were more knowledgeable than those from small companies.

Answer	Number of employees			
	1 to 19	20 to 249	250+	Total
	Percent	*Percent*	*Percent*	*Percent*
Full explanation	9	10	17	12
Partial explanation	53	61	68	61
Don't Know	29	22	9	20
Incorrect definition given	5	4	4	4

Thirty–four percent of the small businessmen, 26 percent of the middle-sized business representatives, but only 13 percent of the large corporation spokesmen were poorly informed about the metric system when initially contacted by an interviewer. Those most likely to have indicated they were poorly informed about metric measurement were associated with Agriculture and Forestry/Fisheries—32 percent and 37 percent as compared with 20 percent for the entire sample population.

TABLES 7–8A & B

Q. I–4 Have you ever *used* the metric system yourself?
Q. I–5 In what way did you use it?

Over half (54%) of those interviewed had used the metric system at some time. Again, the lowest percentage of prior usage was among the small businessmen.

Had used metric system previously:	
Organizations with—	Percent
1–19 employees	42
20–249 employees	51
250+ employees	69

Those industries in which a majority of spokesmen stated they had had no experience with use of the metric system were:

	Percent
Agriculture	54
Forestry/Fisheries	53
Construction	53
Retail Trade	49
Real Estate	50

With the exception of Construction, it seemed that those industries farthest from manufacturing had the highest percentages of nonusage.

Of those who had had experience with the metric system, the most frequent usage had been in the following places:

Place	Percent of users only
School	59
Work	38
Armed Services	7
Foreign Travel	13
Hobbies	4

Of those respondents who had used the metric system previously, those in the Forestry/Fisheries (44%), Construction (44%), Transportation (44%), Wholesale Trade (43%) and Mining (43%) industries had the largest percentages of previous users in the work category. Those in Insurance (15%) and Finance (21%) least often said they had used the metric system on the job.

TABLES 9–11A & B

Q. 6 & 6a 6. Does the metric system have any advantages or disadvantages that you know of? 6a. What are these?

Only about 60 percent of the sample population said they were aware of any advantages *or* disadvantages to the metric system. That 60 percent cited advantages about 20 percent more often than disadvantages (1496 versus 998 mentions).

The greatest advantage of the metric system was said to be that it is easier to use. Appreciation for its "accuracy" and its uniformity with measurement systems in use elsewhere in the world were also cited. In proportion to the number of respondents contacted within those industries, more advantages were cited by firms in the Communications, Finance, and Insurance industries. Utilities and Mining firms had high percentages citing disadvantages.

Within the 60 percent saying there were advantages/disadvantages the categories of response cited most often and the industries citing these most frequently were:

Advantages

Easier to use	Forestry/Fisheries (64%), Real Estate (57%)
Uniformity	Finance (42%), Services (30%)
"Accuracy"	Communication (33%)

Disadvantages

Difficult to convert	Forestry/Fisheries (45%), Real Estate (43%)
Expensive to convert	Forestry/Fisheries (18%), Mining (16%)

TABLES 12A & B

Q. I–7 How do you think it would affect your company if the United States decided to adopt the metric system?

The attitude expressed in answers to this question was generally that of acceptance of the idea. Few spokesmen (even in Real Estate, less than one third of the industry) anticipated that their firms would experience much, if any, serious difficulty in converting to the metric system, but more large corporations foresaw trouble than did small businessmen. Fifty-one percent of the total sample gave answers indicating no particular concern at the prospect of national adoption of the metric system, 33 percent mentioned some adverse aspect. Twenty-six percent of the population were classified in the "Don't Know" or "No Answer" categories to this question.

	Number of employees			
	1–19	20–249	250+	Total
	Percent	*Percent*	*Percent*	*Percent*
Adoption of metric system would affect company not at all or very little	33	28	23	28
Just would take time to get used to it	16	24	28	23
Tools have to be changed	5	4	6	5
Educational problems	3	6	8	5
Confusion	4	3	5	4
Expensive	5	6	10	7
Disastrous	0.4	0.8	1.2	0.8
Other adverse remark	8	11	15	11
Specific beneficial remark	5	7	8	6

By industry, initial reactions to the idea of conversion were strongest among those cited on page 63:

	Highest percents		Lowest percents	
Would affect industry very little, if at all	Finance	49	Utilities	6
Takes time to get used to it	Real Estate	41	Finance	13
Tools have to be changed	Forestry/Fisheries	16	Insurance Agriculture	2 2
Educational Problems	Forestry/Fisheries	16	Insurance	2
Confusion (in change period)	Communication	8	Insurance Construction	0 3
Expensive	Wholesale Trade	12	Real Estate Agriculture Finance	0 2 2
Disastrous	Insurance Wholesale Trade	2 2		

This question was asked in a majority of cases before any educational materials had been sent to respondents. The answers given thus represented mostly the attitudes toward, and state of knowledge about, the metric system that existed because of previous interest or contacts.

QUESTIONNAIRES IIA AND IIB. CURRENT USE OF MEASUREMENT SYSTEMS IN COMPANY OUTPUTS

After the initial contact and administration of attitude and knowledge questions, an appointment was made with respondents to complete the remainder of the questionnaire (sections II, III, and IV). In the interim, informative materials were sent to the respondents concerning the metric system and mentioning certain specific questions which would be asked during the second call.

Section II of the questionnaire deals with the current use of measurement systems in company outputs. Respondents were admonished to answer these questions in terms of their domestic activities unless foreign operations were specified. One form of this section of the questionnaire was drafted for product related firms (Form A) and another form for service related firms (Form B). The forms were substantially the same and differed only in that the questions were designed to be appropriate for the industry output. Product related industrial groups included: Agriculture, Forestry and Fisheries, Mining, Construction, Utilities, Wholesale Trade, and Retail Trade. This group was asked the questions on Form IIA.

Service related industry groups included: Transportation, Communications, Finance, Insurance, Real Estate, and Services. This group was questioned using schedule IIB.

The table on the next page presents the populations of product and service related firms which received each form of section II.

Forms IIA & IIB questionnaire form	Number of employees							
	1 to 19		20–249		250+		Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
IIA Product related	352	14	365	14	371	14	1,088	42
IIB Service related	499	19.5	498	19.5	478	19	1,475	58
Total	851	33	863	34	849	33	2,563	100

Thus, nearly 60 percent of the total population (evenly distributed by size class) was administered the service-related form of section II, based on "a priori" evaluation of their probable activities.

TABLES 14A & B

Q. IIA & B–1 Could you please give me a brief rundown of your company's major activities?

When asked this question, 74 percent[1] of all respondents listed a service activity as one of the major activities of their company, while 40 percent listed a product activity. The proportion of service-to-product activities remained fairly constant among the different size classes. One percent of all respondents listed a major activity which was classified as neither product nor service.

These percentages indicate that the "a priori" evaluations of firms as service-related or product-related over-estimated the percentage of product-related firms. Since the product-related questionnaire (IIA) was the more inclusive of the two forms, no data escaped. Some firms were asked questions, however, which probably were not applicable to their operations so that an unusually large proportion of "No Answers" appears in many appendix tables as a result.

Eight of the 13 industries in the nonmanufacturing population showed a majority of respondents claiming that their companies' major activities were primarily *service oriented:*

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[1] These percentages will add to more than 100 percent since any responding firm was permitted to mention a service and/or product and/or other activity.

	Percent firms within that industry
Insurance	100
Real Estate	97
Finance	96
Transportation	96
Communications	96
Construction	92
Services	90
Utilities	86

In the remaining five industry groups, *product activities* were said to be the major functions:

	Percent firms within that industry
Mining	83
Retail Trade	78
Wholesale Trade	75
Forestry/Fisheries	74
Agriculture	68

Several of the industry groups which were heavily product-related also had high percentages of firms which listed service-related activities. These data show that product-oriented industry groups had greater diversity of interests than did companies oriented primarily to service.

TABLES 15–16A & B

Q. IIA & B–2	Do you quote any prices on measurements such as length, area, or volume?
Q. IIA & B–3	How about quoting prices based on other measurements such as weight, temperature, or thermal content?

To determine current use of measurement systems in actual sales of products or services, all respondents were asked if they used measurement units when quoting prices.

More than half (53%) of all respondents in all size classes stated that they quoted prices based on length, area, or volume, but only 36 percent said that they made price estimates based on weight, temperature, or thermal content. Respondents (44%) in the 250+ employee class said their firms used weight, temperature, or thermal content when quoting prices more often than did spokesmen for the 2 smaller classes of organizations.

Quotation of prices	Number of employees			
	1–19	20–249	250+	Total
	Percent	*Percent*	*Percent*	*Percent*
a. By length, area, volume:				
Quoted prices	51	54	54	53
Did not quote prices	48	46	45	46
b. By weight, temperature:				
Quoted prices	30	35	44	36
Did not quote prices	69	64	55	63

This information is an indication of the degree of usage of measurements in actual dealings with consumers or customers. Sixty-three percent of all firms said they quoted prices based on measurement units ("YES" to Question 2 and/or Question 3). This has implications for consumer education and employee education.

Firms quoting prices	Number of employees							
	1–19		20–249		250+		Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Based on length, area, volume *and/or* weight, temperature	533	63	549	64	537	63	1,625	63

Percentages of firms quoting prices based on measurement units varied widely between industry groups. With an average of 53 percent of the respondents citing prices based on length, area, or volume, and 36 percent on weight, temperature, or thermal content, it would be expected that some industries would use the two groups of measurements more often than the mean.

It will be noted that the Wholesale Trades and Transportation industries appear in both tables (p. 67), indicating that member firms used a greater variety of measurement units than companies doing other kinds of work. The Finance, Insurance and Services groups claimed the least use of measurement units of any kind.

Industries Most Often Quoting Prices Based on Length, Area, Volume

Industry group	Percent firms in that industry
Construction	86
Wholesale Trade	65
Real Estate	63
Transportation	60

Industries Most Often Quoting Prices Based on Weight, Temperature, Thermal Content

Industry group	Percent firms in that industry
Mining	72
Agriculture	61
Forestry/Fisheries	58
Wholesale Trade	53
Transportation	51

TABLES 17–20A & B

Q. IIA–4	I'm going to read some measurement dimensions. Could you tell me which measurement system—that is, U.S. or metric—you use to describe each dimension when your product(s) (is) (are) sold?
Q. IIB–4	I'm going to read some measurement dimensions. Could you tell me which measurement system—that is, U.S. or metric—you use to quote prices for each of these dimensions?

Tables 17–20 show in detail the percentages of firms in the population of interest which said they currently used metric measurements in the U.S. as part of their sales related measuring activities. The following text tables (A through C) show highlights from Tables 17–20: Metric usage for various measurement dimensions by industry groups. In all of these text tables, the term "some metric" usage covers all responses > 0 percent metric including "indeterminate" and "100 percent metric." Zero and 100 percent usage were considered to be most significant of all classifications and have been treated separately in the following analytical text tables.

A. Extent of Metric Usage in U.S. to Describe Products or Quote Prices

Metric Usage in the U. S. to Describe Products or Quote Prices[1]

Measurement dimension	0 Percent metric usage[2]	100 Percent metric usage[2]	Some usage (including 100 percent)			
			Number of employees			
	Total sample	Total sample	1–19	20–249	250+	Total sample
Length/Area	43	0.8	2.9	3.2	6.9	4.4
Volume	31	0.6	2.0	3.4	4.7	4.0
Weight	35	1.1	2.9	3.7	8.8	5.2
Temperature	11	0.2	0.3	0.8	3.1	1.4

[1] Percentages in this table will not add to 100 percent. Responses not represented here are "NO ANSWER" and "DIMENSION NOT RELEVANT."

[2] Differences in responses between employer size groups were so small that only the total sample population percentages are shown here. For detail, see complete Tables 17–20A in app. C. (Can be purchased from NTIS under COM–71–00689.)

- The vast majority of nonmanufacturing firms use no metric units in connection with sales of a product or service.
- A somewhat greater percentage of large firms reported use of metric units than small or medium sized firms.
- Less than 1 percent of the sample firms (see text table above) were currently using the metric system for 100 percent of their product descriptions or sales quotations.
- A larger percentage of firms said they used metric units to describe weight, length/area, and volume, than temperature.
- The metric system is currently being used to some extent in this country to describe products sold or to quote prices: Approximately 8 percent of the responding firms indicated "some" use of metric measurements. The table below shows the numbers and percentages of the total sample population which had at least some metric usage for *any* of the measurement dimensions.

Number of employees							
1–19		20–249		250+		Total	
Number	Percent	Number	Percent	Number	Percent	Number	Percent
44	5	57	7	103	12	204	8

B. "Some" Metric Use in U.S. Sales:

The percentages of firms which reported using metric units "sometimes" to quote price or describe products varied by industry groups. Those industries which used metric measurement at all were fairly consistent in applying it to all five kinds of measurement units. (See histograms on p. 70.)

Wholesale Trade, Retail Trade, Mining, Forestry/Fisheries, and Transportation mostly had greater percentages of firms currently using some metric units in connection with sales. Finance, Insurance, and Real Estate made almost no use of metric units. Communications was the only industry in which there were *no firms* using metric units for any measurement dimension.

C. 100 Percent Metric Use for U.S. Sales:

Examinations of the percentages of firms within the different industries which said they employed metric units exclusively when quoting price or describing products, showed that industries with 100 percent metric use correspond fairly well to those claiming "some" use. (See histograms on p. 71.)

Wholesale Trade, Retail Trade, and Services were the only industries in which some respondents used 100 percent metric measurement for all physical dimensions during U.S. sales. Agriculture and Utilities which had only moderate representations of firms using metric "sometimes", had some of the highest proportions of companies using SI exclusively in domestic commerce. In these cases, the figures mean that nearly all the firms in these 2 industries which used metric at all, used metric measurements exclusively.

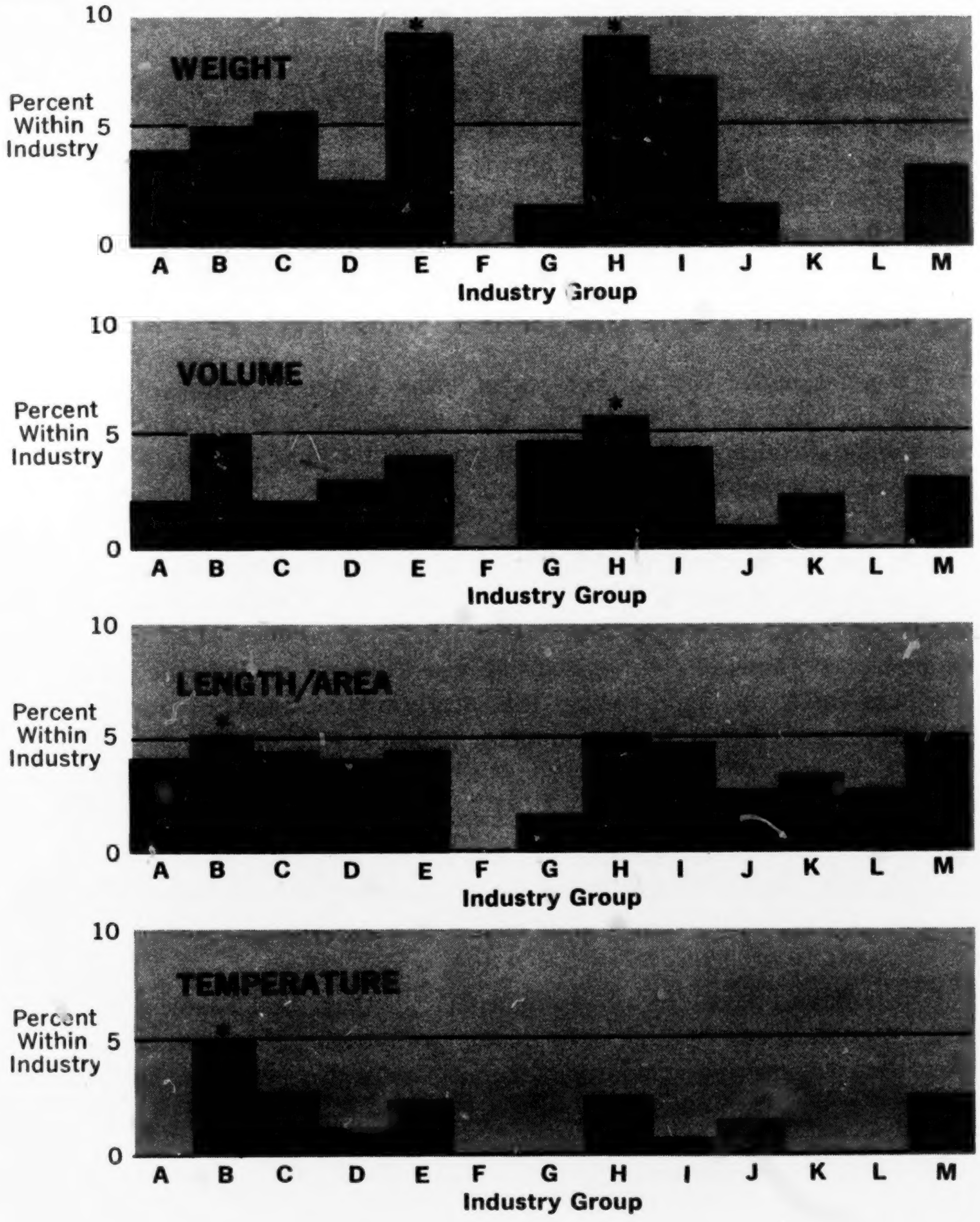
TABLES 21A & B

Q. IIA & B–5 Are there any engineering or size standards which you use in selling your (services) (products)?

Thirty–four percent of all respondents said they used engineering standards in connection with sales. A greater proportion of large firms said that they used engineering standards in connection with sales than did either of the smaller employer classes.

Use of engineering standards during sales of product or service	Number of employees			
	1–19	20–249	250+	Total
	Percent	*Percent*	*Percent*	*Percent*
Use	27	33	41	34
Do Not Use	57	51	46	51
No Answer/Don't Know	16	16	13	15

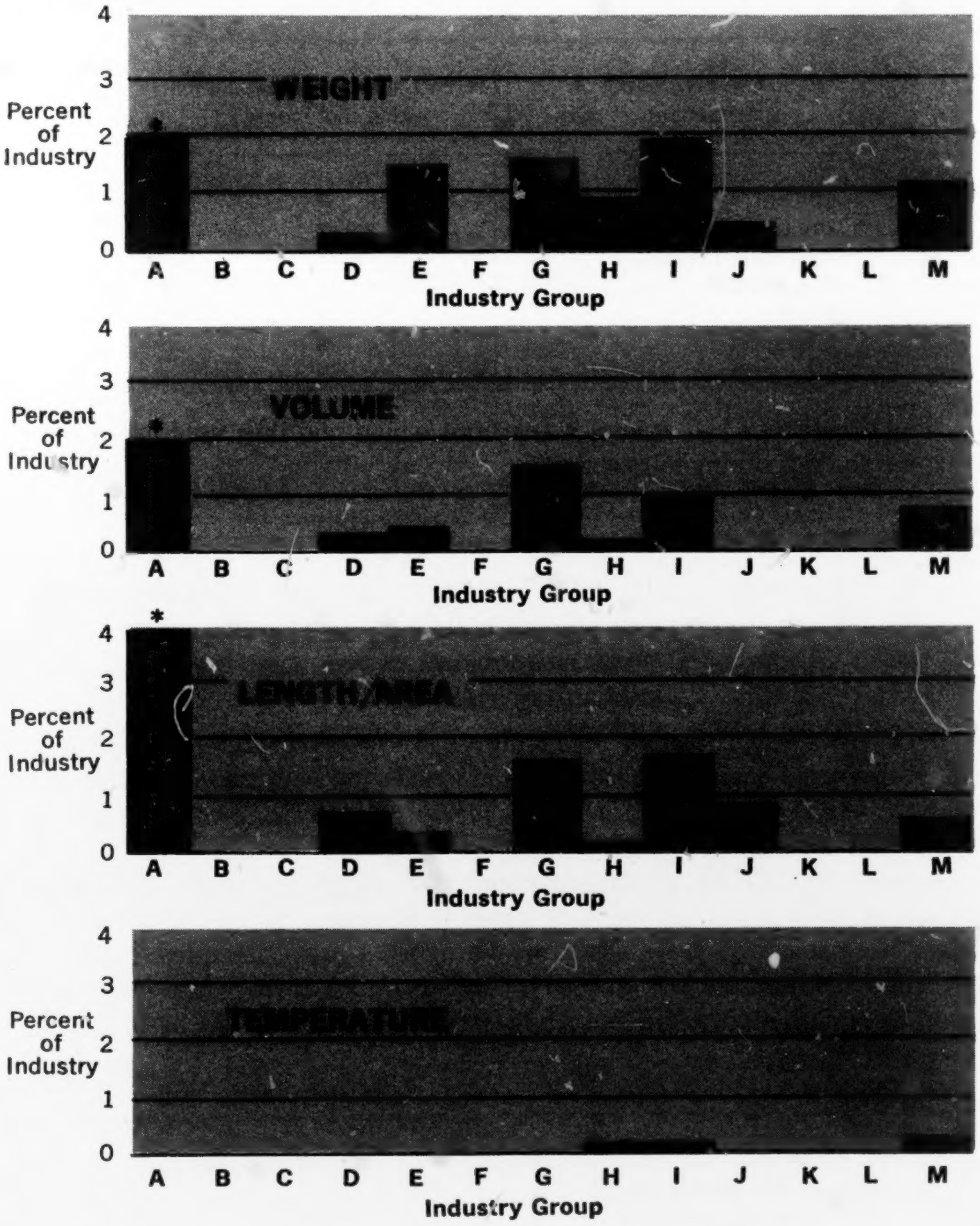
PERCENT FIRMS HAVING "SOME" METRIC USAGE IN SALES-RELATED ACTIVITIES (BY INDUSTRY)



A. Agriculture
B. Forestry / Fisheries
C. Mining
D. Construction
E. Transportation
F. Communications
G. Utilities
H. Wholesale Trade
I. Retail Trade
J. Finance
K. Insurance
L. Real Estate
M. Services

*Industry group with highest percentage for that dimension.

PERCENT FIRMS HAVING 100% METRIC USAGE FOR SALES-RELATED ACTIVITIES (BY INDUSTRY)



A. Agriculture
B. Forestry / Fisheries
C. Mining
D. Construction
E. Transportation
F. Communications
G. Utilities
H. Wholesale Trade
I. Retail Trade
J. Finance
K. Insurance
L. Real Estate
M. Services

*Industry group with highest percentage for that dimension.

A number of individual industries showed a substantial representation of companies using engineering or size standards in selling services or products, but only 2 had clear majorities. The 4 with the largest numbers of users and the 2 with the fewest users are shown below:

Use engineering or size standards in sales	Percent total sample population within that industry
Mining	59
Utilities	52
Wholesale Trades	48
Construction	45
Finance	8
Insurance	8

All 13 industries had at least a few firms which said they used engineering or size standards during sales activities.

TABLES 22A & B

Q. IIA & B–5b (If "YES" to "Are there any engineering standards you use in selling your (product) (service)?") What measurement system (are those) (is that) standard(s) based on?

It will be recalled that in answering Q. 5, 34 percent of the population stated they used engineering standards in connection with sales. That 34 percent (N=863) were then asked which measurement system was the basis for the engineering standards used.

A majority (81%) of the subpopulation stated that their engineering standards were based on the U.S. system. However, about 5% said their engineering standards were based on the metric system, and slightly over 6 percent listed both the U.S. and metric systems. Less than 1 percent of those queried said that they did not know which system was the basis for the standard(s).

Measurement System Used for Engineering Standards	Number of employees			
	1–19 (N=233)	20–249 (N=282)	250+ (N=348)	Total (N=862)
	Percent	*Percent*	*Percent*	*Percent*
U.S.	82	83	79	81
Metric	4	4	6	5
Other	3	1	2	2
Both U.S. & metric	5	6	8	6

It will be noted that there was no appreciable difference in usage according to size class.

By industry, nine of the thirteen groups had at least one firm which was using engineering standards based on the metric system. Because of the small numbers in proportion to each industry population, percentages tend to be misleading and therefore, number of respondents is given in the following text table as well as the percentage of that industry. Only the largest numbers of users are shown here. Industries not listed had one or two representatives each. (Industry percentages shown in the text table are for the total sample within that industry. Percentages given in the full table in appendix C are for those within each industry who stated that they used engineering standards.)

Industry users of metric-based engineering or size standards	Number	Percent total sample population within that industry
Using metric-based standards only		
Services	13	2
Utilities	10	16
Retail Trade	8	2
Wholesale Trade	7	2
Using both U.S.-and metric-based standards		
Wholesale Trade	15	3
Services	18	3
Mining	7	6
Retail Trade	6	1
Transportation	6	2
Construction	5	2

In summary, of the total sample 34 percent used engineering or size standards in sales; of the 34 percent, 11 percent used metric standards or U.S. and metric standards; 82 percent of the engineering standards users employed U.S. standards exclusively.

TABLES 23A & B

Q. IIA & B–6 Could you discuss for a moment the *reasons why* your company uses the measurement units or standards you just mentioned?

The measurement system employed (either U.S. or metric) was chiefly used because:

	Percent total sample
It is traditional	50
Customers demand it	14
The industry has agreed to use it	15
The suppliers determine it through the materials they provide	8

No other answer was offered by a significant number of respondents. All but one of the reasons given were concerned with influences or pressure from outside the company.

There were 268 respondents who had stated in their answers to Qs. 4 or 5b that they used "some" metric units or standards in connection with sales of products or services. The text table below shows the percentages of response from this group for each category compared with the percentages of response from those respondents who had no usage of metric units or standards, and with the total sample:

Reasons for use of present measurement system	Percent firms with "some" metric [1] (N=269)	Percent firms with 0 percent metric [1] (N=2294)	Percent total sample [1] (N=2563)
Tradition	44	51	50
Customers demand it	28	12	14
Industry agreement	27	14	15
To meet foreign competition	6	0.1	0.7
Improve quality/performance	4	0.1	0.5
Suppliers determine it	15	7	8
Law requires it	4	2	2
To meet domestic competition	2	1	0.9
Other	16	5	6
Don't Know/No Answer	5.4	33	30

[1] Percentages will add to more than 100 percent because respondents were allowed up to three mentions of reasons.

It should be noted that the 268 "metric users" include respondents who made only very minor use of metric units or standards. Therefore, the proportions of firms responding in some answer categories are similar to the proportions of "nonmetric" firms and to the total sample. The 2 responses, to meet foreign competition, and "improve quality/performance," however, were given almost exclusively by "metric users."

The highest response categories for "metric users" were

Tradition	44
Customer demand	28
Industry agreement	27
Suppliers determine	15

Nine of the 13 industry groups showed majorities stating that "tradition" was the strongest reason for their use of the U.S. system of measurement. Those that did not have such majorities showed even larger percentages in the "No Answer" category indicating perhaps that measurement was a less significant factor in their operations. The Finance, Communication, Insurance, and Services groups cases in point.

The Retail Trades were most sensitive to "customer demand" (20%), and Mining and Utilities cited "Industry Agreement" most frequently (about 30% each.)

"Suppliers" had the most influence on measurement system usage in the Wholesale and Retail Trades and in Construction (12–13% each).

TABLES 24A & B

Q. IIA & B–7 Do you ever package any goods or products?

Dimensions may refer to the product itself or to the descriptors on the package only. With food products, for example, translation of the weight or size of items contained in the package into metric units is sufficient and the edibles themselves need be neither separately labeled nor altered in size to fit different measurement units.

Twenty-three percent of the total population stated that they packaged goods or products, but the majority of firms (76%) said they did not. A greater percentage of firms in the 250 or more employees class said they carried out this activity than in either of the 2 smaller employer groups.

	Number of employees			
	1–19	20–249	250+	Total
	Percent	*Percent*	*Percent*	*Percent*
Do package products	14	23	32	23
Do not package	85	76	67	76

Four industry groups showed greater frequency of product packaging than the average industry group:

	Percent firms in that industry packaging products
Forestry/Fisheries	52
Wholesale Trade	49
Agriculture	37
Retail Trade	32

Five other industry groups showed low incidence of product packaging activities.

	Percent firms in that industry not packaging products
Utilities	96
Insurance	98
Real Estate	91
Transportation	90
Finance	90

Product-related industries had, as might be expected, higher percentages of firms concerned with packaging goods or products.

TABLES 25–27A & B

Q. IIA & B–7a What measurement units are used to describe the container or package? First of all for length or area? And volume? And weight?

The 23 percent (N=586) of the total population which packaged goods or products was asked about the measurement units they used to describe their packages or containers. The measurement system used by those firms for each type of package dimension are shown below.

Measurement system used for packages or containers by those firms that package goods or products (N=586)	Package dimension		
	Length/area	Volume	Weight
	Percent	*Percent*	*Percent*
No Answer/Don't Know	44	45	22
U.S. system	50	49	71
Metric system	1.4	1.5	1.2
Both U.S. and metric	4	4	5

Examination of the text table above reveals that the overwhelming majority of firms used containers or packages described in U.S. units—regardless of package dimension required. There was a little use of metric units, however.

The unusually large "NO ANSWER" category of responses to these questions indicated that that particular package measurement description was not relevant to the output of that portion of the responding companies. If we look at the proportion of "U.S." to "METRIC" to "BOTH U.S. AND METRIC" for only those companies for which a particular package dimension description was relevant, the percentages become:

Measurement system	Relevant descriptions only		
	Length/area	Volume	Weight
	Percent	*Percent*	*Percent*
U.S.	90	89	91
Metric	2	3	1.5
Both U.S. and metric	7	8	7
	(N=329)	(N=322)	(N=454)

More firms reported packages described in "both U.S. and metric" units than in metric units only, but SI did have appreciable representation in all commercially used dimensions. Temperature is not a package characteristic.

Histograms (p. 78) present the percentages of firms within each industry which use metric units and the percentages which use U.S. and metric units to describe package dimensions. Note that these figures are based on the total sample populations within each industry, *not* just those who said they package products.

The use of metric units within industry groups to describe package dimensions, either alone or in combination with U.S. units, showed weight descriptors to be the most frequently employed. All 3 kinds of metric dimension descriptors were more often used in combination with U.S. units than they were alone.

It will be noted that the firms which most frequently employed metric measurements exclusively for package dimensions were the Wholesale and Retail Trades and Services groups. These industries, of course, included various phases of the pharmaceutical industry which has been on the metric standard for a number of years.

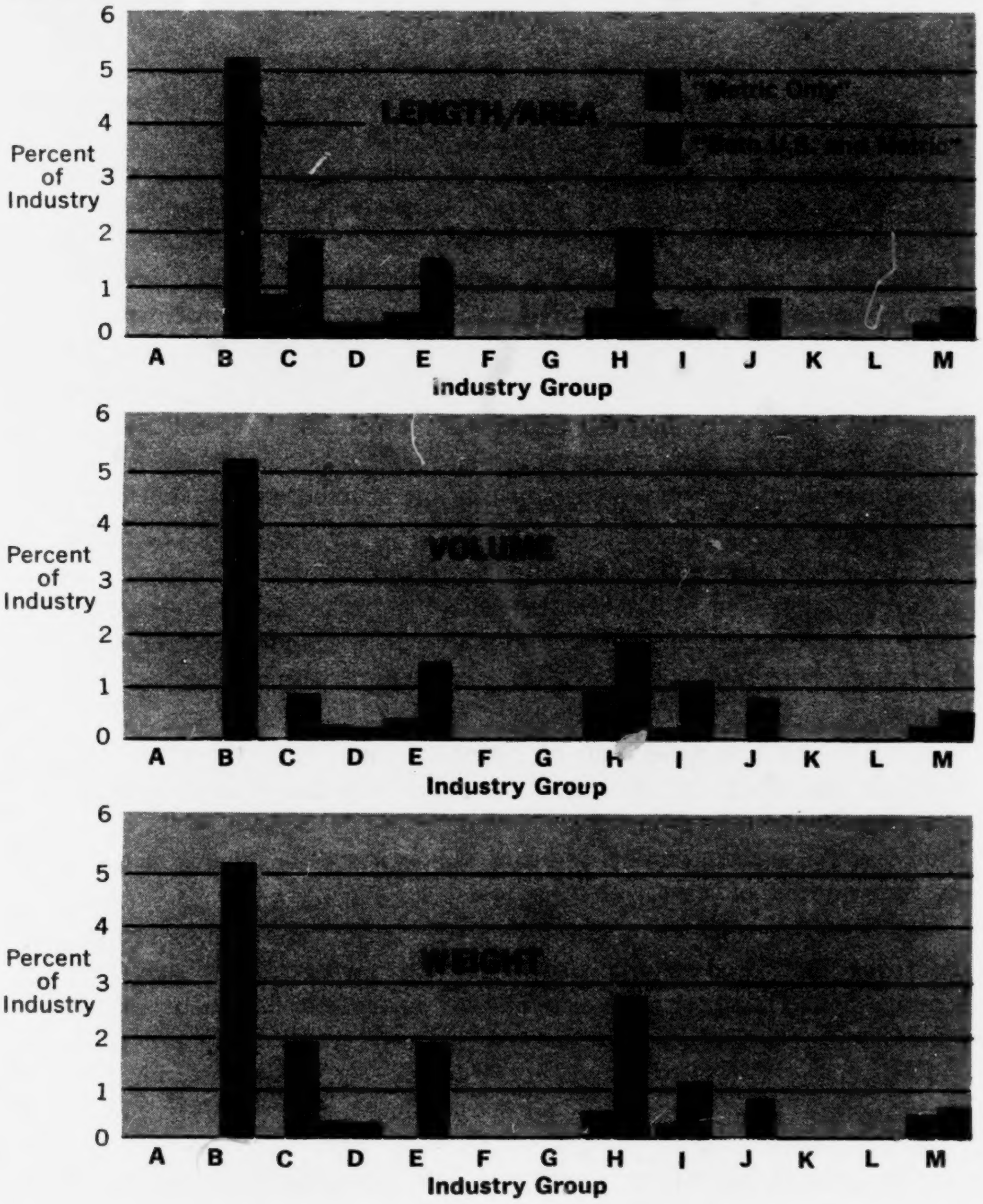
The largest groups of "both U.S. and metric" users were in the same industries that used metric exclusively on packages. Forestry/Fisheries, Mining, and Transportation also became significant packagers in the dual dimensioning class.

TABLES 28 & 29A

Q. IIA–13 and IIB–8	Does your organization have any licensee or subsidiary operations in foreign countries?
Q. IIA–14 and IIB–9	(If YES) What measurement system is used in your foreign operations?

About 11 percent of all responding firms stated that they had foreign licensees or subsidiaries. A larger percentage of firms with 250 or more employees had licensees/subsidiaries than firms in either of the smaller size classes.

PERCENT FIRMS WITHIN EACH INDUSTRY USING "METRIC UNITS" OR USING "BOTH U.S. AND METRIC UNITS" TO DESCRIBE PACKAGES (BY MEASUREMENT DIMENSION)



A. Agriculture
B. Forestry / Fisheries
C. Mining
D. Construction
E. Transportation
F. Communications
G. Utilities
H. Wholesale Trade
I. Retail Trade
J. Finance
K. Insurance
L. Real Estate
M. Services

Foreign licensee/subsidiary	Number of employees			
	1–19	20–249	250+	Total
	Percent	*Percent*	*Percent*	*Percent*
Had	2	5	27	11
Did not have	95	91	68	85

All firms which stated that they had licensee or subsidiary operations in foreign countries (N=291, 11%) were asked about the measurement system used in these foreign operations. The majority of those firms (61% of the subgroup or about 8% of the total sample) said that they use metric "sometimes" for foreign operations: 36 percent used metric exclusively and 25 percent used both U.S. and metric. Metric usage appeared to be related to the size of the responding firms:

Measurement system used in foreign operations	Number of employees			
	1–19	20–249	250+	Total
	(N=17)	(N=42)	(N=232)	(N=291)
	Percent	*Percent*	*Percetn*	*Percent*
U.S.	23	38	22	25
Metric	23	26	39	36
Both U.S. and metric	29	12	27	25

In the 1–19 employee size class, the largest percentage (29%) of firms used "*both U.S. and metric*" in foreign operations. There were nearly equal percentages of these small firms in all these categories of measurement system usage, however. In the 20–249 employee size class, the largest percentage of firms (38%) used the *U.S. system exclusively* in foreign operations, with only 12 percent using both systems. In the group of largest firms, the highest percentage of firms used the *metric system exclusively* (39%) for foreign operations.

If the combined foreign operation data are examined for only those respondents who answered "metric," or "both U.S. and metric" (p. 80), the amount of metric usage shows an even more striking difference. The differences between size classes of firms becomes more apparent. A greater percentage of the smallest companies use both measurement systems simultaneously, but the largest companies were more prone to use metric exclusively in foreign operations. These figures may reflect either greater flexibility in operation or differences in size of investments abroad—the larger the operational facility, the more urgent the need to adapt to the customs of the host

	Number of employees			
	1–19	20–249	250+	Total
	(N=17)	(N=42)	(N=232)	(N=291)
	Percent	*Percent*	*Percent*	*Percent*
Metric OR U.S. and Metric	53	38	65	61

country. Medium–sized companies have often passed the point of maximum flexibility in company activities but have not yet reached a size where adaptation becomes mandatory. Medium–sized firms in this study often reflected the most conservative point of view of the 3 employer groups.

TABLES 28 & 29B

There was wide variation among industry groups in terms of the percentages of firms which had foreign licensees or subsidiaries. The 2 measurement system(s) used in foreign operations were also employed in varying proportions by the different industries.

Industry group [1]	Percent Firms in that industry having licensees or subsidiaries		Percent using each measurement system for foreign operations [3]		
			U.S.	Metric	U.S. & Metric
	Number	*Percent*			
Wholesale	102	24	22	42	28
Mining	25	23	28	28	40
Finance	17	14	23	18	12
Services	70	11	21	33	24
Transportation	29	11	34	31	21
Insurance [2]	6	10	17	17	17
Forestry [2]	2	10	50	50	0
Utilities [2]	3	5	33	33	0
Retail	18	4	17	33	33
Communications [2]	1	4	100	0	0
Construction	13	4	23	69	8
Real Estate [2]	1	3	100	0	0
Agriculture [2]	3	3	67	33	0
Total	291				

---

[1] Listed in decreasing order of percent firms in that industry having licensees or subsidiaries in foreign countries.

[2] Note that these industries have fewer than 10 firms which had licensees [illegible] subsidiaries and are, therefore, not discussed below in terms of measurement system used in foreign operations.

[3] Percentages across these 3 columns may not add to 100 percent because the "Don't Knows" are not shown.

There was little consistency among industries with respect to the relative percentages of firms which used either measurement system. In all groups, however, a greater percentage of firms used either U.S. exclusively or metric exclusively (combining responses of "U.S." and "METRIC") than used a combination of the two.

When the responses "METRIC" and "BOTH U.S. AND METRIC" are combined it is apparent that a majority of firms used metric at least part of the time while only a relatively small percentage used the U.S. system exclusively.

The construction industry is notable for having the highest percentage of firms using metric exclusively in foreign operations and the lowest [2] using both U.S. and metric.

Thus, in general: Firms having licensee or subsidiary operations in foreign countries are more likely to use one measurement system exclusively in foreign operations, rather than to use both. However, these firms are also more likely to use the metric system at least partially in foreign operations than they are to use the U.S. system exclusively.

TABLES 30A & B

Qs. IIA–15 and IIB–10 Why is that system used?

The 291 respondents who stated that their firms had licensees or subsidiaries in foreign countries were asked why they used the measurement system they had named. The answer given most frequently was that the system being used was the national standard in the country of operation (51%). This response was the favored reply in all employer size classes.

The next most frequently given response varied according to size class. The measurement system referred to is obvious from the statement of the answer.

Number of employees in firm	Most commonly given response by size class	Percent
1–19 (N = 17)	National standard in that country	41
	Items originate in U.S.	18
	Foreign customers understand	12
20–249 (N = 42)	National standard in that country	36
	Easy to convert	12
	Items originate in U.S.	12
250 + (N = 232)	National standard in that country	55
	Foreign customers understand	9
	Most efficient system	6
	Items originate in U.S.	6
All employees (N = 291)	National standard in that country	51
	Foreign customers understand	8
	Items originate in U.S.	8

---

[2] Among the industry groups having more than 10 firms which had licensees or subsidiaries.

The industries most frequently naming the reasons for measurement usage shown in the table on the preceding page were:

Reason	Industry	Percent firms having foreign licensees/subsidiaries	
		Number	*Percent*
National standard in that country	Mining	17	68
	Wholesale Trade	59	58
	Services	37	53
	Retail Trade	10	56
	Transportation	11	38
Items originate in U.S.	Transportation	5	17
	Wholesale Trade	9	9
	Services	3	4
Foreign customers understand	Wholesale Trade	10	10
	Services	5	7
Easy to convert	Wholesale Trade	7	7
	Services	4	6

The U.S. firms were evidently willing to adapt to foreign measurement to some extent, most often when the importing country required it, but an appreciable percentage implied they felt the world should adapt to the U.S. It can be inferred that many of them probably did not really *know* how foreign purchasers felt about the measurement system used or how much sales might have been affected because of the system used in fabrication or labeling.

TABLES 31–32A & B

Q IIA–16 and IIB–11	Did measurement considerations influence your decision to operate a foreign licensee or subsidiary?
Q. IIA–16a and IIB–11b	How did measurement considerations influence your decision?

Only 0.2 percent of the total population of firms indicated that measurement considerations had had any effect on their decision to operate or not operate a licensee or subsidiary in a foreign country. Just 4 respondents out of the total of 2563 answered this question affirmatively and each respondent was in a different industry group. So small a number of replies did not yield meaningful information.

TABLES 33–34A & B

Q. 11A–18 and IIB–12	In general do you think the measurement units or standards used for foreign goods have affected the sales of those goods in the U.S.?
Q. IIA–19 and IIB–12a	Why is that?

More than half of the total population of interest (56%) stated that they thought sales of foreign goods in this county *have not* been affected, 35 percent gave a noncommittal "Don't Know" response, but only 12 percent believed that the importation of foreign goods to this country had been influenced by the measurement system used in fabrication or labeling. These percentages were distributed fairly evenly across size classes with the exception that the weight of opinion from the largest firms (58%) was strongest in the "no effect on sales" category. The importations referred to in these answers were those goods imported for sale to others, those imported for the corporate use of these establishments as well as the competitive lines in the respondent's own fields of industrial or commercial enterprise.

Those industry groups with the highest percentages of firms stating that they thought sales of foreign goods in this county *have* been affected by the measurement units or standards used (Real Estate, Finance, and Utilities), are industries which describe themselves as nonproduct industries. The industries with the highest percentages of firms stating that sales of foreign goods in this county *have not* been affected by the measurement units or standards used are highly product related (Wholesale and Retail Trades). This is not what might have been expected.

The reasons given for thinking that foreign goods did pose problems which were related to their base measurement system were chiefly that parts are difficult to obtain, are not interchangeable with those of U.S. products, and are generally more expensive than those made locally. Furthermore, size differences in parts are confusing to many clients. Many foreign products are converted to U.S. measurement equivalents when imported, respondents said, because this conversion is not a difficult process.

Measurement, in general was said to be of little concern to the Agricultural organizations, the Wholesale/Retail Trades, or Services because of the ease of conversion.

The industries chiefly offering the answers summarized above were as follows:

Of the 12 percent who said measurements for foreign goods *had* affected sales:	Industry with highest percentage	
Different measures a disadvantage	Construction	23
Parts not interchangeable	Transportation	37
Parts difficult to obtain	Mining	22
	Wholesale	17
System not understood in U.S.	Agriculture	37
	Wholesale	31

Of the 53 percent who said measurements for foreign goods had not affected sales:	Industry with highest percentage	
Measurement not a concern	Forestry/Fisheries	60
Foreign products converted in U.S.	Transportation	33
	Wholesale	21

Other industries had some representation in each of the areas detailed above, but replies were in too small numbers to be considered representative.

Data presented here indicate one thing—in the U.S. there are some difficulties, primarily associated with later repair, in buying goods from abroad which have been fabricated to metric measurement standards. U.S. consumers have been willing to put up with these inconveniences and U.S. merchants have adapted to the demand by converting metric to U.S. units where such translation was necessary. Most goods bought as units do not require immediate servicing and the need for replacement parts and interchangeability is something not all buyers foresee. The kinds of goods which have continuous interchange with the local economy are either imported to the U.S. in small numbers or a servicing capability has been established here to meet the need. The foreign automobile servicing industry is a case in point.

Measurement units used in the manufacturing or processing of goods do not greatly influence sales of foreign produced merchandise in the U.S. For those goods which require a close interchange with the economy, special accommodations have been developed. The U.S. measurement system, then, offers little impediment to the importation of foreign goods.

TABLE 35A & B

Q. IIA–9 Does your company ever export any U.S. products to foreign countries?

Only those companies which received the product-related form II (IIA), or those which indicated product activity, were asked about export activities (N=1477).

Export activities appeared to be related to company size: Approximately 41 percent of the largest firms within "product" industries had some export activities as compared with 14 percent for medium-sized and 6 percent for small companies. Twenty percent (N=298) of the 1477 respondents who were asked this question reported some export activities. (This is 11% of the total population.)

Members of 7 of the 13 sampled industries, as shown in the text table below, carried on considerable export activity. Those not listed either dealt with services only or with intangibles such as Finance, Real Estate, Communications, etc.

Exporters in	Percent of total within industry having exports
Wholesale Trade	38
Mining	34
Agriculture, Forestry, Fisheries	20
Retail Trade	9
Construction	9
Utilities	6

TABLES 36–37 A & B

Q. IIA–9 When you export products, do you describe those products with the same measurement units you use for U.S. sales?

Q. IIA–9a Does this change present any problems?

The majority (64%) of the 291 firms who exported goods or services said they used the same measurement units to describe exports as for U.S. sales and 12 percent "sometimes" did. A fairly large percentage (29%) changed to SI for exports. (Metric measures would not have been appropriate for goods exported to Canada and other members of the British Commonwealth at the time the survey was conducted.) Altogether, 32 percent (N=96) respondents "sometimes" or always use metric measurements for exports.

The largest firms more often reported incongruence between the measurement system used to describe products for U.S. sales and for exports than medium and small sized companies did. A greater percentage of large firms than either of the other groups reported the policy of "sometimes" using the same system for both markets, and "sometimes" changing. A smaller percentage of large firms (59%) reported always using the same measurement system for U.S. and export markets than either medium (76%) or small sized firms (70%), thus indicating greater marketing capabilities.

Within industry groups the percentages of exporting firms which followed each of the three measurement policies with respect to exported goods were:

Industry group	Percent exporting firms using same system for U.S. & export	Percent exporting firms using different systems U.S. & export	Percent exporting firms sometimes using same system for both U.S. & export
Agriculture (N=20)	85	5	10
Mining (N=36)	50	28	17
Construction (N=26)	61	27	11
Wholesale Trade (N=161)	63	22	12
Retail Trade (N=38)	82	10	5
Services (N=9)	44	11	22
Total	N=290 of 298 exporters		

Inspection of the above list shows that firms in Agriculture and the Retail Trade were more likely to use the same system for both U.S. and export sales than were members of other industry groups. The Mining (28%) and Construction (27%) exporters had the largest percentages of firms which changed measurement systems for export sales or services.

When measurement practices of "not the same" and "sometimes the same" as for U.S. sales are combined, it is apparent that large proportions of the exporting firms in Mining (45%), Services (44%), Construction (38%), and Wholesale Trades (35%) used metric measurements for their exports at least part of the time.

These exporting firms (N=96) were further probed for problems associated with changing or combining measurement systems. Although 57 percent of this population stated that there were no problems, there again was variation among the different-sized firms.

Greater percentages of large firms (64%) and medium-sized firms (40%) stated that changes in measurement systems for exports presented no problems at all. Specific problems cited by 35 percent of the sample fell into two classes: problems associated with converting measurements and with maintaining dual systems.

Problems associated with measurement incongruence	Number of employees			
	1–19 (N=6)	20–249 (N=15)	250+ (N=75)	Total (N=96)
	Percent	*Percent*	*Percent*	*Percent*
No problems, none	16	40	64	57
Conversion problems	17	33	23	24
Dual system	33	13	9	11

In the individual industries, a majority of firms in each stated that there were no problems associated with the use of two measurement systems for domestic and export sales. The proportions of firms giving each response within each industry were roughly the same as for the total population.

The data imply that an exporting firm which uses one measurement system for describing products in the U.S. and another for export sales is more likely to convert from one system to the other than it is to use both systems simultaneously.

The Mining and Wholesale Trade industries had the largest numbers of exporting firms which always or sometimes changed measurement systems for their exports. Eighty-one percent of those Mining firms stated that this measurement policy presented no problems. Conversely, over 40 percent of the Wholesalers mentioned problems associated with using both measurement systems.

TABLES 38–39A & B

Q. IIA–10 How about engineering standards, are they the same as for U.S. sales?

Q. IIA–10a Is this ever a problem for you?

A majority of the 298 exporters stated that they used the same engineering standards for U.S. products as for exports. Less than a sixth used different engineering standards for exports, and some said their operations didn't need any engineering standards for either kind of sales.

Only 4 percent of all exporters claimed they *sometimes* used one engineering standard for U.S. sales and another for exports. The difference between this low percentage and the 12 percent who "sometimes" *described* products in SI for export may indicate the relative difficulty involved in operating with two engineering standards as compared with two kinds of labels or dimension descriptions.

Congruence between engineering standards for U.S. sales and export sales	Number of employees			
	1–19 (N=30)	20–249 (N=71)	250+ (N=191)	Total (N=298)
	Percent	*Percent*	*Percent*	*Percept*
Engineering standards:				
Same	63	61	62	62
Not same	13	17	16	16
Sometimes same	0	6	4	4

The relative percentages of firms which followed each of the 3 policies within each industry group were approximately the same as for the total sample population: The majority in all cases used the same engineering standards for both domestic and foreign sales.

Only 20 percent (N=58) of all exporters (N=298) stated that engineering standards for exports were always or "sometimes" different from those used for U.S. sales. When this subgroup was probed for problems associated with changing engineering standards for exports, the majority of the small and medium-sized companies gave no answer to the question.

	Number of employees			
	1–19 (N=4)	20–249 (N=16)	250+ (N=38)	Total (N=58)
	Percent	*Percent*	*Percent*	*Percent*
No answer	100	62	18	36
No problems	0	19	53	40
Some problems	0	19	29	24

The majority of those who did answer, cited no problems in following this policy. A few firms in the medium and large employer classes said they had had some difficulties with conversion and dual systems, but the proportion of these was too small to be significant.

Of the 14 mentions of either conversion or dual system as a problem in conducting export trade, 8 were in the Wholesale Trades.

TABLES 40–41A & B

Q. IIA–11	Do you feel that the volume of your export sales ever depends on the measurement units you use?
Q. IIA–11a	(If YES to Q. 11) To what extent?

Preceding questions had led respondents to think about the characteristics of any international trade in which they might have been engaged. They had been asked about the kinds of measurement units used to describe the exported products and the engineering standards which had been employed either in the fabrication or the selling procedures for exported goods. In Qs. 11 and 11a the respondents were queried as to how much they thought the use of U.S. measurement units and standards had affected the volume of goods exported—how much foreign resistance had there been to buying goods fabricated to U.S. sizes.

Only 9 percent (N=26) of the exporting firms indicated that they felt the volume of their export sales depended on the measurement system they used to describe their goods. More large firms (12%) than medium (4%) or small (0%) indicated this dependence.

Within the Mining and Construction industries slightly higher proportions of respondents thought that the volume of their export sales depended at least to some extent on the measurement system used for their exports.

Twenty-three of the largest firms and 3 medium-sized companies gave the following reasons why they believed their export volume depended on the measurement system used:

Reasons export volume depends on measurement system [1]	Number	Percent
Competition	5	19
Country requires own system	10	38
Foreigners dislike conversion	5	19
Don't Know	2	8
No Answer	4	15
Total	26	100

[1] Mostly to accommodate to foreign government and customer requirements.

The small numbers of respondents preclude separate analysis by industry group except to say that almost half of those who mentioned the importance of measurement units in exports were in the Wholesale Trades.

From the text table shown above, it appears that the chief reason for using SI was a feeling that if they wished to export goods to foreign countries, they had to adapt to local requirements.

TABLES 42–43A & B

Q. IIA—12	How about engineering standards, do you feel that the volume of your export sales ever depends on the engineering standards you use?
Q. IIA—12a	(If YES to Q. 12) To what extent?

Only 6 percent of the exporting population stated that they felt the volume of their export sales *was* affected by the engineering standards used. More large firms (7%) than medium (4%) or small (3%) saw standards as an area of concern, but the majority (73%) of exporters said that engineering standards had no effect on volume of sales.

A relatively large percentage (18%) of the exporting firms gave no answer to this question, indicating perhaps that they use no engineering standards in connection with exports.

Relationship between engineering standards and volume of export sales	Number of employees			
	1–19	20–249	250+	Total
	Percent	*Percent*	*Percent*	*Percent*
Export volume:				
Depends on engineering standards	3	4	7	6
Does not depend on engineering standards	70	72	74	73

The 18 respondents (6% of all exporters) who recognized a link between volume of export sales and the engineering standards used, were probed for extent of the relationship. Seven respondents were unable to elucidate further, and the other 11 responses were so varied that no central tendency appeared. Neither was a pattern evident when those 11 respondents and their choices were tabulated by industry group.

In summary, there may have been reasons why a few respondents thought the kind of engineering standards used affected their export sales, but there was little unanimity in their opinions. This kind of scatter in responses usually reflects uncertainty, perhaps even ignorance of the true causal facts, if indeed they exist at all. The unusually large percentage of "Don't Know" answers tends to support this hypothesis.

Other nonmanufacturing exporter respondents may have in the majority dealt in products where engineering standards had been required only in the equipment needed to produce the goods. The nonmanufacturing sector of the economy is largely devoted to extracting, processing, and service activities, where the size of the final product depends largely on its origin in nature or its manufacturing process.

TABLES 44A & B

Q. IIA—17 To your knowledge, are the products that you sell in the U.S. also imported to *this country* by foreign firms?

This question was intended to determine the amount of competition that the U.S. nonmanufacturing industries experience from foreign imports. The query was addressed to all firms that had been classified or identified as product-related. About 50 percent of the largest companies indicated that foreign imports did share their U.S. market. This suggested that the largest companies both here and abroad are the mass producers of widely consumed goods and are, therefore, probably competitive both in the U.S. and elsewhere.

Small and moderate sized companies, which deal much more frequently in specialty goods, had less competition from foreign imports—only about 40 percent acknowledged it.

Relationship between own product and foreign imports	Number of employees			
	1–19 (N=499)	20–249 (N=492)	250+ (N=470)	Total (N=1461)
	Percent	*Percent*	*Percent*	*Percent*
Product imported from foreign countries	37	39	50	42
Product not imported from foreign countries	52	49	40	47
No Answer	5	6	5	5
Don't Know	6	6	5	5

Slightly more than half of the firms in the distributive industries—Wholesale and Retail Trades–reported that the products they sold were also imported into the U.S. from foreign countries. Those industries in which the largest number of firms indicated that the product they sold was *not* imported by foreign firms were Utilities (71%) and Construction (65%).

In certain of the other industries (see table below) about half the firms indicated either no competition from foreign imports or said they didn't know of any. Those industries not listed in the text table were not in the product-oriented part of the sample, i.e., Finance, Real Estate, et al.

It appeared that the industries most directly concerned with exports to other countries, such as Agriculture and the distributive industries were also those most affected by foreign products imported into the United States. Trade is, in other words, a 2-way street. Those activities dealing chiefly with services—Utilities and Construction—were least subject to foreign competition in the U.S.

To your knowledge are the products you sell in the U.S. also imported to this country by foreign firms?	Percent product–oriented firms in that industry						
	Agri-culture	Forest/ Fisheries	Mining	Con-struction	Utilities	Whole-sale Trades	Retail Trades
Yes	43	19	34	21	18	52	55
No	42	56	55	65	71	41	34
Don't Know	6	6	8	6	0	4	6
No Answer	8	19	3	8	11	3	5

TABLES 45A & B

Q. IIA—17a Are the measurement units or standards for these foreign imports (See Q. 17, tables 44 A & B) different from the ones used in *your* U.S. sales?

Units or standards used on about 27 percent of the imports to the U.S. were said to be either the same or "sometimes" the same as those employed in goods produced in this country. Nearly two–thirds of these goods bear dimensions in accord with the measurement system in effect in the country of origin. This adherence by foreign producers to the use of SI measurement units has led, of course, to the problems with servicing of imported goods mentioned in Q. IIA—19, Tables 34 A & B.

For products imported into the U.S. the measurement standards were said to be adapted to the American system in these proportions:

Congruence between U.S. units and measurements used in imported goods[1]	Number of employees			
	1–19 (N=184)	20–249 (N=196)	250+ (N=241)	Total (N=621)
	Percent	*Percent*	*Percent*	*Percent*
Units or Standards are:				
Not congruent	53	56	66	59
Congruent	22	20	17	20
Sometimes congruent	4	9	9	7

[1] Only for those firms that had indicated in Q. IIA—17 that the products they sold were also brought into this country by foreign producers.

It will be noted in the table above that the items handled by the major employer firms, the goods with the largest sales volume, were less often adapted by foreign producers to American measurement than were the goods handled by smaller organizations. In the most significant products, either in terms of large numbers of units produced (particularly mass produced) or in terms of high cost per unit, foreign producers were using only the measurement system of the majority of countries. Foreign manufactured automobiles, for example, are produced to metric engineering standards, and the U.S. consumer, as only one of many market areas, is expected to adapt to these measurements. The mechanical parts of foreign cars are rarely, if ever, sized to U.S. measurement standards.

The degree of congruence between the measurement units used in U.S. and in foreign goods varied by the type of merchandise brought into the country. Those goods marketed in units sized by nature (agricultural produce) were most frequently bundled in U.S. dimensioned packages. The Utilities and Construction industries least often said they found imports in their fields adapted to U.S. standards.

Congruence between U.S. units and measurements used in imported goods	Industry [1]						
	Agriculture (N=40)	Mining (N=36)	Construction (N=65)	Utilities (N=11)	Wholesale Trade (N=227)	Retail Trade (N=227)	Service (N=12)
	Percent	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*
Standards are:							
Congruent	25	8	23	9	18	22	17
Sometimes congruent	10	14	0	0	9	7	0
Not congruent	30	58	69	82	61	60	58
Don't Know/No Answer	37	25	9	9	14	12	25

[1] Only those firms which had indicated in Q. IIA—17 that the products they sold were also brought into the U.S. by foreign producers.

In summary, for all industry areas except the Agricultural group, a decided majority of imported goods, when sold in this country, use measurement units or standards of the country of origin. Foreign producers do not appear to need to adapt to the U.S. system in order to provide significant competition in the American market place.

QUESTIONNAIRE III. CURRENT USE OF MEASUREMENT SYSTEMS IN COMPANY INPUTS

In Section III of the questionnaire, company use of measurement systems in their own "in–house" operations was investigated. It was assumed that degree of metric usage in such activities would be a fairly direct reflection of both suppliers' activities with regard to the companies in the sample and actual preference by the company managements for metric equipment and supplies.

TABLES 46–58A & B

Qs. III—1 Does your organization make any significant use of equipment, supplies, components or tools which are *described* in metric units?

III—1a Can you list for me those articles which are described in metric units?

III—1b About what percent of your total (*METRIC ARTICLE*) are described in metric units?

III—1c Are those (supplies) (components) (equipment) (tools) you mentioned described in metric units only, or is there dual dimensioning?

III—1d Which of them have dual dimensioning?

Detailed answers given to Q. III–1 and its parts required multiple tables for proper analysis of the information. Tables 46 through 58, A & B were all devoted to presentation of the data for this question. In answering Q. 1, 401 respondents (16% of the total sample) indicated some current usage of equipment, supplies, or components described in metric units. Of these, the heaviest users were firms with 250 or more employees.

	Number of employees							
	1-19		20-249		250+		Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Use metric items	102	12	121	14	178	21	401	16

The users of metric items were probed further to determine the nature of the items they had mentioned.

Summary of Tables 47A, 51A, and 55A

Kind of metric item mentioned	Those using any metric item	
	Number	Percent [1]
Equipment or tools	357	89
Supplies	50	12
Components	35	9

[1] Multiple answers permitted.

In order to determine whether degree of involvement with foreign commerce had any effect on use *in U.S. operations* of equipment, supplies, or components described in metric units, two special subpopulations were compared with the total sample population: (1) All firms which export to foreign countries, and (2) All firms having licensee or subsidiary operations in foreign countries.

Firms Making Significant Use of Equipment, Supplies, Components Described in Metric Units

	Percent total population (N=2563)	Percent exporters (N=298)	Percent firms having licensees/subsidiaries (N=291)
Uses	16	27	28
Does not use	83	72	71
Don't Know/No Answer	1	0.3	1

It appears that when some portion of a firm's business was devoted to foreign commerce, the organization was more likely to use articles described in metric units in its U.S. operations. More than ¼ of both the exporters and the firms having foreign licensees and subsidiaries made significant use of such goods or equipment as compared with barely 16 percent of the total sample population.

The list of articles mentioned by the 401 respondents was then analyzed for each company to determine whether the equipment, supplies, or components, (a) were *always* described in metric units; or (b) were ever dual dimensioned.

If for example, a respondent said his firm used syringes, drugs, and tape that were described in metric units, he was asked:

> "About what percent of all your *syringes* are described in metric units?"
> "About what percent of all your *drugs* are described in metric units?"
> Etc.
> "Are these *syringes* you mentioned described in metric units only, or is there dual dimensioning?"
> Etc.

In other words, each firm was asked to estimate what percent of the items mentioned was described in metric units and what percent had dual dimensioning. If 3 items were listed, one of which was *always* described (100% of the time) in metric units, the code for that company would be 33 percent metric (i.e., only one third of the 3 metric articles was always metric). If none of the articles was always described in metric units, the code would be 0 percent metric (i.e., none of the articles was always described in metric units). The same rationale applied to the dual dimensioning category. It should be noted that the figures were based on each firm's responses and could include one or more items. The metric only and dual dimension categories were not mutually exclusive because an article can be consistently described in metric units but still be described in the U.S. system as well.

Article	Firms using metric dimensioned items [1]			
	No items always described in metric units (0 percent)		All items always described in metric units (100 percent)	
	Number	Percent	Number	Percent
Equipment or Tools	137	38	172	48
Supplies	17	34	27	54
Components	14	40	15	43

Article	Firms using metric items which were also dual dimensioned [1]			
	No metric items described in both measurement units		All metric items described in both measurement units	
	Number	Percent	Number	Percent
Equipment or tools	226	63	79	22
Supplies	29	59	16	32
Components	19	54	13	37

[1] Percentages between 0–100 percent are not listed due to insignificant impact. See appendix for complete tables.

Over twice as many articles were labeled in metric units only as were described in both systems (67% versus 32%). This may imply that when a firm used equipment, supplies, or components labeled in metric units it accommodated to SI rather than converting from metric to U.S. This finding could also mean that the articles used were not ones in which the measurement description was critical.

The proportions of members within each industry group citing some usage of equipment, supplies, or components described in metric units were (p. 96):

Industry	Number	Percent
Forestry/Fisheries	13	32
Services	142	23
Utilities	14	22
Communication	5	20
Wholesale Trade	80	19
Mining	19	18
Real Estate	5	16
Agriculture	13	13
Retail Trade	51	12
Construction	34	11
Transportation	24	9
Finance	5	4
Insurance	2	3

The responses of those members of each industry group who had indicated significant use of any "metric-described" items were classified to determine the relative proportions who were using metric–described (1) equipment, (2) supplies, and (3) components:

Type of Item Used, Shown as Percent of Metric Users Within Each Industry

Industry	Number	Equipment or tools	Supplies	Components
		Percent	*Percent*	*Percent*
Forestry/Fisheries	13	83	0	17
Utilities	14	100	7	7
Communication	5	100	0	20
Agriculture	13	100	8	0
Finance	5	100	0	0
Insurance	2	100	0	0
Transportation	24	92	12	4
Retail Trade	51	88	10	10
Construction	34	94	6	3
Wholesale Trade	80	87	10	15
Services	142	87	19	8
Mining	19	89	5	0
Real Estate	5	80	40	20

More than 91 percent of all firms which used any item that was described in metric units, used an item that was classified as equipment. In 5 industry groups, every firm which mentioned any use of metric items specified a piece of equipment. Overall frequency of use of metric items was higher in some industries—Services, for example. Relatively few metric components were mentioned in comparison to equipment or supplies.

The preceding text table showed that metric described equipment and tools were much more frequently used by U.S. firms than either supplies or components. The breakdown given below is, therefore, confined to the equipment/tools reply category only. In this text table, if a responding firm said it used certain metric described items, it was then asked if *all* such items in its operations were metric described. If it replied affirmatively, its usage was listed as 100 percent. If only half of the same kinds of articles were metric dimensioned, then the percentage shown is 50 percent. These answers indicate the degree of intrusion of certain metric dimensioned items into U.S. nonmanufacturing operations. If a company once starts using an item from a certain supplier and obtains a stock of tools or equipment that satisfy certain operational requirements, it is highly likely the organization will continue to use such items if performance is satisfactory. Forty-eight percent of metric equipment users said, as a matter of fact, that all the units they had of any particular type of equipment were described by metric units. (See Table 49A.)

Figures in the table below show the beginnings of such incursion, mostly by foreign suppliers. Adaptation by the U.S. consumer to the SI dimensions usually seems to take the form of relabeling the item in U.S. units, or ignoring the problem if output unit size is not critical.

In summary, about 16 percent of all the respondent organizations used at least some metric described equipment, supplies, or components in their own company operations. Two-thirds of those metric items were employed without shift to the U.S. equivalent dimensions. All 13 industries had at least a few metric item users, mostly of equipment.

Users of Metric Equipment or Tools[1]

Industry group	Number	Percent metric items *always* described in metric units		Percent metric items described in both U.S. and metric units	
		0 Percent[2]	100 Percent[3]	0 Percent[2]	100 Percent[3]
Agriculture	13	33	50	58	25
Forest/Fisheries	6	20	40	40	60
Mining	17	59	29	65	18
Construction	32	59	25	50	37
Transportation	23	50	45	48	27
Communication	5	60	20	80	0
Utilities	14	21	64	64	36
Wholesale Trade	72	37	51	60	20
Retail Trade	48	27	62	67	22
Finance	5	100	0	80	0
Insurance	2	0	100	100	0
Real Estate	4	0	75	75	25
Services	126	34	50	69	17

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[1] Percentages between 0 percent and 100 percent are omitted. See appendix, Tables 49B and 50B for complete tables. Some duplication occurs between the 2 categories of use listed here.

[2] No metric described articles used.

[3] All metric items used are metric described.

TABLES 59–71A & B

Qs. III—2 Now I'd like to ask about engineering standards. Does your organization make any significant use of equipment, supplies, components or tools which are designed to *metric engineering standards?*

III—2a Which articles are designed to metric engineering standards?

III—2b About what percent of your total (*METRIC ARTICLE*) are designed to metric standards?

III—2c Are those (supplies) (components) (equipment) (tools) which you mentioned designed to strictly metric standards, or is there dual dimensioning?

III—2d Which of them have dual dimensioning?

About 91 percent of the total sample of respondents said that they *did not* make any significant use of equipment, supplies, or components designed to metric engineering standards. (There is a possibility that this percentage may be spuriously high due to the fact that 90 percent of the company spokesmen in the sample were managerial rather than technical personnel, and they may not, in fact, have been aware of equipment, tools, etc. originally designed to metric engineering specifications.)

A little less than 7 percent (N=173) of the respondents answered that their organizations did use items manufactured to SI engineering standards. The detailed analysis was necessarily based on these respondents only. In consequence, results shown in some of the tables below are based on rather small numbers of respondents and should be viewed with caution.

Slightly more large firms than medium or small said they used metric designed equipment, etc:

	Number of employees							
	1-19		20-249		250+		Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Firms making significant use of equipment, etc., designed to metric engineering standards	39	5	54	6	80	9	173	7

The proportions of responses to this question from two special subpopulations were compared with those of the total sample population. The premise of the comparison was that involvement in foreign commerce might be related to a firm's use, in its U.S. operations, of equipment, supplies, or components designed to metric standards.

Firms making significant use of equipment, supplies, or components designed to metric standards

	Percent total population (N=2563)	Percent exporting firms (N=298)	Percent firms having licensees/ subsidiaries (N=291)
Use	7	14	16
Not use	91	83	80
Don't Know/No Answer	2	[illegible]	4

The percentages of firms that said they used articles designed to metric standards in each of the two subpopulations were at least twice as large as the percentage of firms of the total sample population. Just as for use of articles described in metric units, it might be inferred that firms having dealings with foreign countries are more likely, because of that commerce, to make more use of metric standard equipment, supplies, or components. This inference is further supported by the finding that large firms made more use of metric standard items, since approximately 35 percent of the firms with 250 or more employees were either exporters or had foreign licensees/subsidiaries.

Of the 173 users of metric designed items, by far the majority had invested in equipment or tools:

Summary of Tables 60A, 64A, and 68A

Metric item used:[1]	Number of employees			
	1–19 (N=39)	20–249 (N=54)	250+ (N=80)	Total (N=173)
	Percent	*Percent*	*Percent*	*Percent*
Equipment/tools	82	76	87	83
Supplies	10	15	4	9
Components	8	9	10	9

[1] Respondents could be counted once in each category.

These relative proportions correspond well to those obtained in the answers to Q. III—1, immediately preceding.

The next inquiries were addressed to determining how many kinds of articles were used by the responding company, and what percent of each type were designed to metric engineering standards. About half of the metric-designed equipment users said they used only one kind of metric standard equipment.

Large firms mentioned more kinds of metric standard equipment than smaller firms did. (See Table 61A.)

When respondents thought about the percentages of their operating equipment, tools, supplies, or components that were metric designed, a majority of this subpopulation said *all* (100%) of those kinds of equipment or tools and all of those kinds of supplies were designed to metric standards:

Summary of Tables 62A, 66A, and 70A

Metric designed item	Percent of those items that are always (100 percent) designed to metric engineering standards	
	Number	Percent
Equipment/Tools	74	52
Supplies	10	67
Components	5	31

Apparently, fewer firms consistently used metric-designed components than all other types of material.

Respondents were also asked (for each item mentioned), whether the item was designed to metric standards only or whether U.S. standards were also used. These answers indicated that few of their metric-designed items were dual-dimensioned:

Summary of Tables 63A, 67A, and 71A

Metric designed item	Percent of those items that are dual dimensioned	
	Number	Percent
Equipment/Tools	29	20
Supplies	4	27
Components	5	31

Articles designed to metric engineering standards were not widely used by any one industry group. Those industries showing greatest usage of such items were (p. 101):

Industry	Users of items with metric engineering standards	
	Number	Percent within industry
Services	61	10
Wholesale Trade	33	8
Retail Trade	18	4
Transportation	16	6
Construction	14	5
Mining	11	10
Forestry/Fisheries	3	16

The largest groups of users of metric standard equipment/tools were in the same industries:

Industry	Users of equipment tools with metric engineering standards	
	Number	Percent within industry
Services	54	9
Wholesale Trade	27	6
Construction	12	5
Transportation	13	5
Retail Trade	11	3
Mining	10	9
Forestry/Fisheries	2	10

Tabulations by industry for supplies and components were inadequate for further analysis.

In summary, the great majority (91%) of respondents did not make any significant use of equipment, supplies, or components which were designed to metric standards.

Of the 7 percent who did use metric-designed items, the great majority (84%) had invested in equipment/tools. If they used a metric-designed item, *all* items of that type tended to be designed to metric engineering standards. Less than half of their metric-designed items were also designed to U.S. engineering standards.

The Services industry had the largest number of users of metric-designed goods.

TABLES 72–73A & B

Q. III—3	Were the metric articles you mentioned manufactured in the U.S. or in a foreign country?
Q. III—3a	Could you please estimate what percent were manufactured in a foreign country?

Respondents who indicated current usage of the metric system in inputs to company operations (N=445, 17%) were asked where the articles they mentioned had been manufactured.

Place where metric articles manufactured:	Number	Percent
U.S.	123	28
Foreign Country	111	25
Both U.S. & Foreign	69	15
No Answer, Don't Know	140	31
Total	445	100

They reported considerable use of metric articles produced in the U.S. but only slightly more than of articles imported from foreign countries. Large companies contributed the greatest support to the foreign market; small and moderate-sized firms primarily supported U.S. production; and all groups supported a combination of U.S. and foreign manufacturers in about equal proportions.

Purchase of Metric Items by Source of Manufacture

Source	Number of employees					
	1–19		20–249		250+	
	Number	Percent	Number	Percent	Number	Percent
U.S.	35	31	41	30	47	24
Foreign country	23	20	26	19	62	31
Both U.S. & Foreign	16	14	22	16	31	16
No Answer, Don't Know	38	33	46	34	56	31

The 15 percent (N=69) who answered "Both U.S. and Foreign" were questioned further to determine what percent of these articles had been manufactured in a foreign country.

Percentage [1] of those "both U.S. and foreign" company-used metric articles which came from abroad	Percent firms having that percentage of metric articles manufactured abroad	
	Number	Percent
1–5	9	13
6–10	8	12
11–25	11	16
26–50	10	14
51–99	15	22
Cannot determine percent	12	17

[1] No Answer, 0 percent and 100 percent (N = 3) categories omitted as being in error. See Appendix Table 72A for complete figures.

The majority of buyers (55%) said that less than 50 percent of their purchases were imported, thus indicating a partial but not critical dependence on foreign manufacturers. Seventeen percent of the firms were not able to stipulate the impact of foreign production on the metric articles they used, but indicated that some foreign influence was present.

To put these figures into perspective: If the categories "Foreign Country" and "Both U.S. & Foreign" are combined, 131 firms (about 5% of the total sample) purchased metric goods which were of foreign origin. For about half of these 131 firms all metric goods purchased were manufactured in foreign countries. About 6 percent (of the total sample) or 162 firms bought only U.S. produced metric goods and 143 or 5 percent didn't know where their metric articles had originated. Overall, the use of metric articles manufactured in the U.S. was of significant magnitude. Unfortunately there was no way to discern from the present data whether this was a static or an increasing figure.

In nearly all industries some of the firms which used metric designed/described goods "in house", bought foreign produced goods. The following text table shows that users of U.S. produced metric items were largely concentrated in the Agriculture, Retail Trade, Mining, Services, and Wholesale Trade industries. (Industry groups having fewer than 10 firms which were using metric-designed/described items are disregarded in this discussion, although they are included in the table.) Construction, Transportation, Utilities, and Wholesale Trade had high percentages of users of foreign produced goods.

Of Those Firms Using Metric Designed/Described Items, Place Where Metric Good was Manufactured

Industry	U.S. produced		Foreign produced		Both U.S. and foreign	
	Number	Percent Industry	Number	Percent Industry	Number	Percent Industry
Insurance [1]	1	50	0		0	
Agriculture	6	40	0		2	13
Real Estate [1]	2	40	0		2	40
Retail Trade	19	34	13	23	5	9
Mining	7	33	4	19	2	9
Communication [1]	2	33	2	33	0	
Services	45	28	30	19	33	21
Wholesale Trade	22	25	24	28	18	21
Finance [1]	2	25	1	12	1	12
Utilities	3	21	5	36	0	
Transportation	6	21	11	39	2	7
Construction	7	19	18	49	3	8
Forestry/Fisheries [1]	1	14	2	29	1	14

[1] Total number of users of metric-designed/described items in these industries is less than 10.

Only Services and Wholesale Trade had appreciable percentages of metric users who purchased "Both U.S. and Foreign" produced goods. The breakdown of sources in the "Both U.S. and Foreign" data were too scattered and the numbers too small to permit meaningful analysis. (See table 73B).

In summary, slightly more metric-designed/described articles used in company operations were U.S. produced. The chief users of these U.S. produced metric goods were in Agriculture, Retail Trade, Mining, Services, and Wholesale Trade. The Construction industry was the only industry in which the majority of users of such metric goods purchased items of foreign manufacture. In two industries, Services and Wholesale Trade, there were approximately equal numbers of firms using each of the three sources of metric items.

In terms of the total sample population, about 6 percent of the respondent companies bought U.S. and 5 percent purchased foreign metric goods for "in-house" use.

TABLES 74—75A & B

(If Respondent stated either that he used goods described in metric units or designed to metric standards)

Q. III—4	Has your company found any particular advantages in using metric goods or equipment?
Q. III—5	How about any disadvantages or problems associated with such metric goods or equipment?

The group of firms (N=445, 17% of the total sample) which stated that they used within their own company operations equipment, supplies, or components described in metric units or designed to metric standards, comprised a group that should have had special knowledge about advantages and disadvantages associated with the use of these items in the U.S.

About 41 percent of the *firms* which use metric-designed/described goods listed one or more advantages associated with that use while only 24 percent of those 445 firms listed one or more disadvantages. (See "none" categories in tables 74 and 75A.) About 64 percent of the 301 *answers* to Qs. 4 and 5 (multiple answers were permitted) concerned something advantageous with regard to the metric items used; while only 36 percent of the replies could be classified as disadvantages associated with the use of SI designed/described items.

The advantages and disadvantages mentioned fell into several major categories:

	Number of employees			
	1–19 (N=112)	20–249 (N=136)	250+ (N=197)	Total (N=445)
	Percent	*Percent*	*Percent*	*Percent*
1. Advantages				
Easier to use	11	14	16	14
"More accurate"	12	7	13	11
Standardized	5	8	6	6
Miscellaneous	13	12	14	13
None (don't know of any)	62	62	55	59
2. Disadvantages				
Difficult to convert	8	7	10	8
Service/Repair Parts Difficulty	5	5	9	7
Education/unfamiliarity	2	7	7	5
Dual system	2	1	4	3
Miscellaneous	0	0	0.5	0.2
None (don't know of any)	81	78	71	76

Large firms tended to cite slightly more advantages *and* disadvantages than smaller firms.

It will be noted from the table above that the advantages cited for using metric equipment/tools, components, or supplies were all factors which referred to characteristics of the metric system itself. Conversely, the disadvantages listed centered around the fact that the metric system was not widely known or used in the U.S. None of the disadvantages referred to a disadvantage of the measurement system as such.

Disregarding those industries with fewer than 10 users of metric described/designed items; Agriculture, Services, Wholesale and Retail Trades most frequently mentioned the 3 specific advantages shown in the text table preceding. Frequencies in each industry group for the disadvantage answer categories were too scattered to draw much information, however; Agriculture, Construction, Wholesale Trade, and Services had higher percentages of their members mentioning "difficult to convert."

In summary, of 445 users of metric-designed/described materials, almost twice as many mentioned advantages as disadvantages in using these articles. All the advantages listed were associated with the characteristics of the metric measurement system itself; all disadvantages dealt with the use of metric items in the present U.S. setting.

TABLES 76—77A & B

Q. III—6	Which of the following phrases best describes how important measurements and measurement calculations are to your overall company operations?
Q. III—7	If you think of the total man-hours in your organization that are devoted to making measurements or measurement calculations, about what percent of this total would you estimate is spent using the metric measurement system?

Measurements were considered to be a "very important" part of company operations by nearly half the total sample of nonmanufacturing organizations but a greater proportion of the largest companies said so than either medium or small:

Level of importance of measurement in company operations	Number of employees			
	1–19	20–249	250 or more	Total
	Percent	*Percent*	*Percent*	*Percent*
Very important	38	47	51	45
Moderately important	20	18	15	18
Relatively unimportant	21	18	20	20
Not at all important	21	16	13	16

About 20 percent of the responding firms spent at least a little time using metric measurements and, again, the group of largest companies used SI more often than the smaller sized respondents:

Percent usage of SI measurements	Number of employees			
	1–19 (N=850)	20–249 (N=863)	250+ (N=849)	Total (N=2562)
	Percent	*Percent*	*Percent*	*Percent*
1–5	6.2	7.8	13.9	9.3
6–10	2.0	2.0	3.5	2.5
11–100 [1]	4.9	4.9	6.0	5.3

[1] See Table 77A for detailed breakdown.

Measurement was said to be "very important" in company activities by the percentages of respondents in each industry as presented below. The accompanying column shows the proportions of members in each of these groups which devoted at least 1 percent of their organizational man hours to usage of metric measurement. It will be noted that correspondence between the two columns of data is not high.

Industry	Percent of industry	
	Measurement very important	Using metric 1+ percent of man-hours
Construction	75	12
Real Estate	66	13
Utilities	61	20
Forest/Fisheries	58	26
Mining	53	21
Wholesale Trades	52	24
Transportation	52	16
Communication	44	32
Agriculture	41	20
Retail Trades	38	16
Services	35	25
Finance	11	7
Insurance	8	7

In summary, both the use of measurement and the employment of the metric system were somewhat more important to large companies than to small. Measurement was most important in the company activities of the Construction and Real Estate industries but both of these groups had relatively few metric users. Every industry, however, had at least a few users of the SI.

Physical dimensions were least important to those groups dealing primarily in money and investments. Metric measurement was most prevalent in industries in which measurement was chiefly said to be less than "very important" (Communication, Services).

SUMMARY: Sections II and III

Sections II and III of the questionnaire were devoted to current use of the metric system in company outputs and inputs respectively. "Output" questions were concerned with the measurement system used when quoting prices or when describing products for sale. "Input" questions asked about usage of metric-described or metric-designed equipment, supplies, or components within the company's own operations.

The data show that more than twice as many firms used the metric system for some parts of their own "in house" operations as used it for sales-related activities. Only 8 percent of the population of interest said they ever used metric units or standards when quoting prices or when labeling goods for sale. This is compared with 16 percent of the sample who said they made significant use "in house" of metric described equipment, supplies, or components; and 7 percent who made significant use of such articles that were designed to metric standards. (A total of 17% of the sample used metric-described *and/or* metric-designed items.) When asked to think in terms of percentage of man-hours devoted to metric measurements or measurement calculations in their company operations, 20 percent of the sample said they used the metric system at least a little in these activities.

The same industry groups appeared to be the largest users of the metric system in company inputs *and* outputs although the percentages of users varied in the same ways as those for the total population. The Transportation and Communications industries were anomalies to this general rule: Communications showed high percentages of metric users in "in house" activities, but *no* firms which used metric units to quote prices. Transportation, which was one of the industries which had noticeable use of the metric system for sales-related activities, did not report high use of metric units or standards for company inputs.

Industry Groups Having Largest Percentages of Firms Using Metric Units and or Standards in

(1) Company inputs

20 Percent or more of industry made significant use of metric-described items	10 Percent or more of industry made significant use of metric-designed items	20 Percent or more of industry used "some" metric for measurements or measurement calculations
Forestry/Fisheries Services Utilities Communication	Forestry/Fisheries Mining Services	Communication Forestry/Fisheries Services Wholesale Trade Mining Utilities Agriculture

(2) Company outputs		
5 Percent or more of industry used metric units or metric + U.S. units to describe packages	5 Percent or more of industry used metric units to quote price or describe products during sales	5 Percent or more of industry used metric standards in sales-related activities
Mining	Transportation Wholesale Trade Retail Trade Mining Forestry/Fisheries	Utilities Mining

QUESTIONNAIRE IV. FUTURE USE OF METRIC MEASUREMENT

Section IV of the questionnaire dealt with the company's own plans for use of the metric system in the future and with its attitudes toward increasing use of SI on a national basis. Many of the questions in this section were devoted to attitudes toward, and probable effects of, a hypothetical planned national program of metrication with specific characteristics. This "planned national program" was defined with specific assumptions so that each company could react to the same basic program and answers would be comparable.

CHARACTERISTICS

1. All major countries except the U.S. are now metric.
2. There would be a nationally planned program in the U.S. to increase the use of the metric measurement system in this country.
3. The changeover to the metric system would be completed by the end of a designated time period.
4. Within the designated time period, all changes to metric language for printed materials such as signs, catalogues, deeds, and labels would be made only when such materials needed to be revised; and all changes to metric sizes or engineering standards would be made only for new or redesigned parts or products.
5. Existing equipment would be used until the end of its normal life cycle; the only changes to metric units would be in dials, gages, and indicating devices.
6. You could establish your own schedule for conversion to metric language or standards, as long as these changes were accomplished within the designated time period.
7. All goods and services normally used by your organization would be available in metric terms as needed and at no extra cost to you.

8. The metric system would be taught in all U.S. schools during the transition period and the general public would be gaining familiarity with the metric measurement system at the same time.

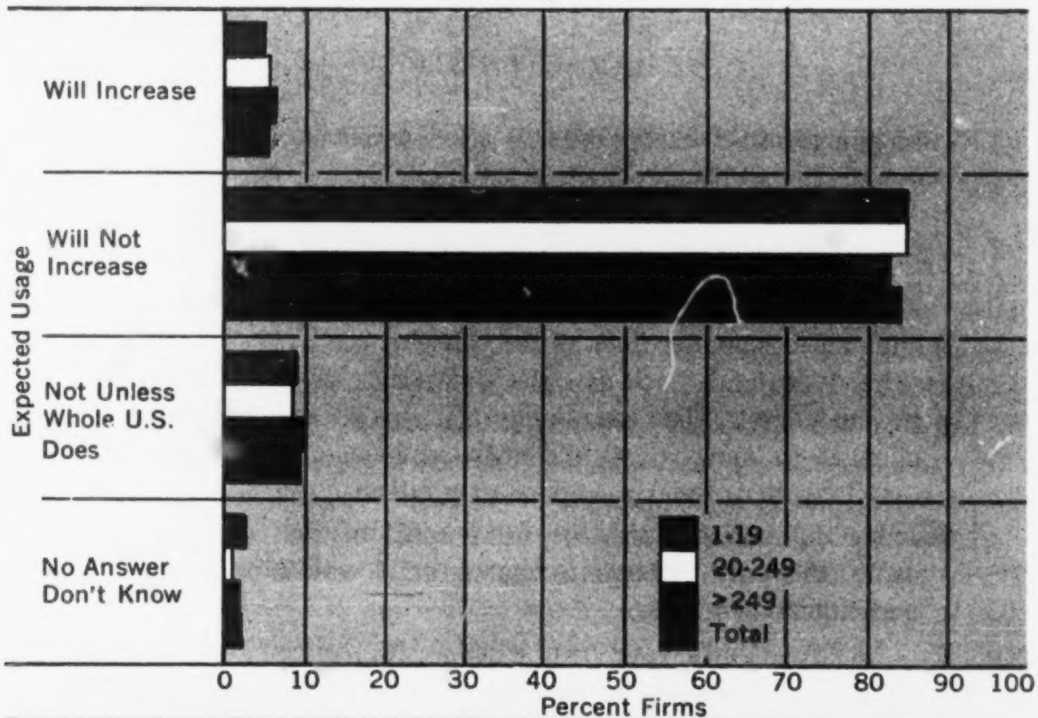
We've adopted those characteristics to find out how a nationally planned program *might* affect you. Let me emphasize that no program of this type actually exists. It's purely hypothetical.

TABLES 78A & B

Q. IV—1 Do you think that your organization will ever use or increase its use of metric measurements on its own?

On the average, about 6 percent of all respondents said they expected their organizations to increase their use of metric measurement of their own volition, but the great majority of companies in all size categories indicated no such intent. About 10 percent said they would be glad to see the whole U.S. change but their organizations would not change unless the whole economy did. A few more large organizations had some intention of increasing metric usage voluntarily than small ones did (7% compared with 5%).

ESTIMATED FUTURE USE OF THE METRIC SYSTEM ASSUMING NO GOVERNMENT ACTION: "ON THEIR OWN" (BY SIZE CLASS)



The industries most and least frequently saying they probably would adopt greater use of metric measurement on their own were:

Most often	Percent	Least often	Percent
Forestry/Fisheries	10.5	Finance	1
Wholesale	9	Construction	2
Communication	8		
Services	7		
Mining	7		

The responses given by the subpopulations of (1) exporters, (2) firms having foreign licensees and subsidiaries, and (3) firms currently making significant use of equipment, supplies, or components described in metric units or designed to metric standards, can be compared with the total sample population percentages:

Firms which will use or increase use of metric measurements on their own

	Percent total population (N=2563)	Percent exporting firms (N=298)	Percent firms having licensees/ subsidiaries (N=291)	Percent firms using metric equipment, supplies, component (N=445)
Will increase use	6	12	13	17
Will not increase use	83	76	77	70
Not unless whole U.S. does	10	9	8	11
Don't Know/No Answer	1	2	1	1

Within all 3 of the subpopulation groups shown in the above table, the percentages of firms which said that they intended to increase their use of metric measurements voluntarily were at least twice as large as the percentage found in the total sample. In the sample population, 149 firms (6%) stated that they would use or increase their use of metric measurements on their own in the foreseeable future. Of these 149 firms, 76 or 51 percent were firms that were already making significant use of equipment, supplies, or components described in metric units or designed to metric standards.

In the same vein; there were 445 firms which stated that they were currently making significant use of metric-designed or metric-described goods or equipment. Of these 445 firms, 76 or 17 percent said that they intended to increase their use of metric measurements in the future. The percentage of firms in this special subpopulation was nearly 3 times as great as that with similar intentions in the total sample.

In summary, experience with using metric-designed goods was favorable enough to have inclined a significant proportion of respondents towards increased employment of such items. When this group is added to those who are apparently waiting for "the whole U.S." to change, it appears that about one-sixth of the population has an above-average interest in national adoption of SI.

TABLES 79A, B & C

Q. IV—1a Why is that? (Probe for: why company would or would not ever increase use of metric measurement on its own?)

When probed as to *why* they would increase their use of metric measurements voluntarily, 34 percent of the 149 spokesmen in this subgroup said increased use of metric measurement would improve the quality of their output or of their performance. About the same percentage of respondents (30%) stated they thought the SI could ease international commerce and a few (13%) mentioned it would help them meet foreign competition.

The chief reason given for having *no* intention to make greater use of metric measurements voluntarily was that companies thought there was no need to do so (61%), besides which their customers didn't demand it (16%). Fewer small firms (5%) were concerned about the cost of changeover than large organizations were (10%).

Some greater willingness to convert to the metric system may have been implied by those (8%) who said they could not change alone. This group was chiefly comprised of members of the Construction, Transportation, Mining, and Real Estate industries.

By industry the strongest and weakest levels of advocacy of the various reasons given above were:

Reason	Most mentions	Percent [1]	Least mentions	Percent [1]
Would ease international commerce.	Forestry/Fisheries	10	Communication	0
	Wholesale Trade	3	Insurance	0
			Real Estate	0
Meet foreign competition	Forestry/Fisheries	5	Mining	0
	Transportation	2	Communication	0
			Utilities	0
			Finance/Insurance/Real Estate	0
Improve quality/performance.	Communication	8	Agriculture	0
	Real Estate	6	Forestry/Fisheries	0
	Utilities	5	Finance	0
			Insurance	0
No need to increase	Insurance	76	Wholesale	51
	Finance	73	Real Estate	53
	Communication	64		
No customer demand	Wholesale	20	Real Estate	6
	Mining	18	Forestry/Fisheries	10
	Retail Trade	17	Utilities	11

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[1] Percentages of total sample populations within each industry regardless of answer to Q. IV—1.

In conclusion, about 41 percent of the reasons given for *no* self-initiated action to increase metric usage had to do with relationships with others—industry standards, government requirements, no customer demand, suppliers determine it, etc. On the other hand, less than 9 percent of the answers to this question were concerned with the organization's own determinations—too difficult to change and do not wish to change our equipment. The overwhelming reason for no self-initiated activity—"no need to change"—was probably a statement of neutrality, an interpretation which is largely substantiated by answers to Qs. IV—1, I–7, & IIA & B–6. In terms of the total sample population (regardless of whether the respondent said his company would or would not increase metric usage on its own) a majority of all respondents (58%) and a majority of respondents in every industry group said that there was "no need" to increase metric usage, meaning that as long as the country used the U.S. system, they were better off not trying to "go metric" by themselves.

TABLES 80–82 A & B

Q. IV—2	(If "YES" to Q. IV—1) When do you think you might begin to make changes in your present measurement system on your own?
Q. IV—3	What do you suppose will be some of the advantages of increasing metric usage?
Q. IV—4	How about disadvantages (of increasing your use of metric measurement?)

About 6 percent (N=149) of the total sample had plans to increase their use of metric measurement of their own volition (Table 78, Q. IV—1) and of these, the largest companies more often than smaller ones had such intentions. The most favored time periods for beginning this increased usage were in 1 year and between 4 and 5 years. More respondents said "Don't Know" (35%) or gave "No Answer" (40%) than specified a number of years. No respondent specified over 10 years.

The breakdown by industry group of the responses from the 149 firms showed too much scatter to make distinctions. In all industries, the majorities could not specify a number of years, perhaps implying one of two things: either these firms had been already gradually increasing their use of the metric measurement system and, therefore, did not foresee the occurrence of a marked increase; or else, only slight consideration had been given to this question and no actual changeover policies had been set.

When the 149 respondents who predicted voluntary metrication were asked for advantages and disadvantages of such action, there were appreciable differences between the opinions of large and small companies. The advantages most frequently offered were (p. 114):[1]

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[1] See Table 81A for complete details.

Metric system is or will be	Number of employees			
	1–19 (N=42)	20–249 (N=49)	250+ (N=58)	Total (N=149)
	Percent	*Percent*	*Percent*	*Percent*
Easier to use	36	20	21	25
"More accurate"	19	12	10	13
Standardize international trade	12	24	36	25
Save time	0	4	3	3
No advantages	43	37	34	38

The 3 industries which had appreciable numbers of firms predicting voluntary metrication—Wholesale Trade, Retail Trade, and Services—had all mentioned these SI advantages most often.

Over half (53%) of the 149 respondents who anticipated greater self-initiated use of the metric system said they could see no disadvantages in making such a change. Of the remaining 47 percent intending to increase their use of metric measurement, a few saw problems arising in the areas shown in the table below.

Small organizations listed "confusion" as an outcome of changeover more often than large concerns, but middle-sized groups listed fewer possible disadvantages of increased usage of the metric system.

Disadvantage	Percent intending increase
No problems	68
Inventory	3
Conversion	9
Retraining employees	7
Expense of conversion	6
Confusion	3
Miscellaneous	11

In summary, about 6 percent of the total sample population expected their own companies to increase their use of metric measurements whether the whole U.S. decides to adopt SI or not. The advantages to this policy centered around ease of using metric units for small firms and interest in standardizing international trade for large firms. Disadvantages were expected to result from the process of conversion.

TABLES 83A & B

Q. IV—5 Let's suppose that the firms from which you buy supplies, equipment, tools, or components increased their use of metric measures or standards on their own. What effect would that have on your (company) (organization)?

Opinions as to what it would do to company operations if suppliers were to adopt the SI, were so varied that summarization is difficult. Reactions were just about equally divided between statements favorable and unfavorable to the idea. There was little difference between the groups of organizations with different numbers of employees.

It was conceded by some that if suppliers were to change to metric measurement it would affect the operations of the industries being surveyed, but more than 75 percent of all respondents were in the "Don't Know/No Answer" category. Less than 1 percent added that such action by suppliers could speed up metric conversion.

Favorable and unfavorable reactions were mostly a restatement of ideas presented in the analysis of previous questions:

Favorable	Percent [1]
Statement implying easy adjustment	17
Convert to customer demands	1
Would increase metric usage	2
None—no effect	19
Little effect—general	9
Unfavorable	
Statement implying difficult adjustment	11
Conversion problems	4
Increased costs	3
Confusion	7
Inventory problems	3
Dual dimensioning	5
Retraining employees	5
Unrealistic proposal	0.5

[1] Multiple answers allowed.

The "ease of adjustment" percentages in the above text table are worthy of specific comparison. They encapsulate the general trend for all answers given to this question. All but one of the industries in the sample had more spokesmen for "easy adjustment" than for "difficult". Forestry and Fisheries, the one exception, had one spokesman (5.3%) who thought adjustment would be easy and four (21%) who thought it would be difficult if industry suppliers decided to increase their use of metric measures or standards.

When all favorable and all unfavorable answer percentages are summed in Table 83A, slightly more favorable than unfavorable responses were listed, with the great majority of respondents remaining noncommital.

In summary, suppliers were not thought to be a key group in the metrication picture. If metric-measure goods (equipment, supplies, etc.) were readily available, slightly fewer difficulties than advantages would result.

TABLES 84A & B

Q. IV—6 Do you think your company would face any inventory problems if some industries went metric on their own while others continued to use the U.S. system?

Since the industries in this sample were not manufacturers, except for a few who had dual roles, their confidence in their suppliers was surprising. Only about one third of the total sample said they would expect inventory problems if conversion were haphazard and voluntary. Large organizations expressed more concern than either medium or small companies:

Effect on inventory if suppliers were to go metric at different rates	Number of employees			
	1–19	20–249	250+	Total
	Percent	*Percent*	*Percent*	*Percent*
Would expect inventory problems	27	36	46	36
No problems expected	68	60	52	60
Don't Know/No Answer	5	3	2	3

The individual industries that expected the most trouble with inventory were:

Industry	Percent
Utilities	67
Wholesale Trade	50
Forestry/Fisheries	47

In all other industries, more respondents did *not* expect inventory problems than did expect them. A few citations from table 84B will illustrate this point:

Industry	Inventory problems	
	Expected	Not expected
Agriculture	24	71
Mining	42	54
Construction	39	57
Communication	24	72
Retail Trade	36	59
Services	27	70

Residual percentages to complete 100 percent appeared in the Don't Know/No Answer category.

The conclusion to be drawn from data in this table is that a substantial majority in all but 3 industries believed that their inventories would not constitute particular problems if change to metric measurement were on a haphazard, voluntary basis *by industry*. The implication is that there would be intra-industry agreement as to a suitable time for conversion and as long as all members worked on it together, inventory problems would be minimal. England is using voluntary conversion by industry.

TABLES 85A & B

Q. IV—6a What would be the nature and extent of those inventory problems?

If the U.S. were to adopt the metric system on a voluntary conversion basis, 36 percent of the organizations surveyed said they would experience problems with their inventories. These 933 respondents described the chief problems anticipated as follows:

Problem	Number	Percent total sample	Percent subsample foreseeing problems	Chief industries mentioning
Increased inventory....	257	10	27	Wholesale Trade Retail Trade
Dual measurement.....	196	8	21	Mining Wholesale Trade
Confusion.............	168	7	18	Agriculture Real Estate
Expensive.............	108	4	12	Services Wholesale Trade

The most concerned group were the wholesalers—those middlemen responsible for insuring an adequate flow of goods and services between manufacturer and consumer.

Organizations of all three size categories mentioned inventory problems about equally frequently. The only exception was for one low frequency item not listed in the above text table labeled "hard to replace old parts." Large companies more often expressed this concern than did small ones:

	Number of employees			
	1–19	20–249	250+	Total
	Percent	*Percent*	*Percent*	*Percent*
Hard to replace old parts [1]................	1.7	2.2	4.9	3.2

[1] Percent based on 933 respondents who had said they anticipated inventory problems.

Large concerns carry large inventories and would expect to stock parts for outmoded equipments. If manufacturers shifted *all* production equipment to metric measurement, parts for old models might have to be custom-made. The industry most concerned with obtaining old parts was Agriculture (12%).

In summary, the chief inventory problem accompanying metrication by suppliers was the increased numbers of supplies and parts that would have to be stocked. Middlemen were the most concerned group with regard to inventory size but Agriculture and Real Estate expected the most confusion with the advent of increased metric usage by suppliers.

TABLES 86–87A & B

Qs. IV—7 and 7a	Do you think that the government should take any action to bring about changes in the use of metric units or standards in this country? What sort of action should be taken to bring about these changes?

The answers to this question were stark enough that the percentages will be reproduced in full. It will be noted that a majority of large and medium sized organizations favored government action, small businessmen more often did not.

Should government take action in the use of metric units or standards?	Number of employees			
	1 to 19	20 to 249	250+	Total
	Percent	*Percent*	*Percent*	*Percent*
Government should take action	40	50	59	50
No government action	45	37	29	37
Don't Know/No Answer	15	13	12	13

The industries most and least in favor of government action were as shown below:

Majority [1] in these industries preferred government action	Percent	Majority [1] in these industries preferred *no* government action	Percent
Insurance	66	Construction	45
Mining	56	Agriculture	45
Finance	55		
Services	55		
Real Estate	53		
Communication	52		
Forestry/Fisheries	47		
Utilities	47		
Retail Trade	45		
Transportation	44		

[1] Where percents less than 50 are called "a majority," it signifies that opposing opinions constituted a smaller percentage than those shown.

The text table below presents the proportions of responses to this question within 3 special subgroups: (1) All exporters, (2) All firms with foreign licensees or subsidiaries, and (3) All firms currently making significant use of metric-designed/described goods or equipment.

Should government take action to bring about changes in use of metric units or standards?

	Percent total sample population (N=2563)	Percent exporting firms (N=298)	Percent firms having licen/subsid (N=291)	Percent firms using metric equip, supplies, components (N=445)
Should take action	50	59	64	69
Should not take action	37	32	24	22
Don't Know/No Answer	14	9	12	9

Increasing favorableness toward government action will be noted in the above table as the respondent firms showed more involvement with actual metric usage.

The consensus within the entire sample population was in favor of positive government action to help bring about changes in measurement units and standards. Of those who thought the government should act, 45 percent named a "mandatory national program" as the government's best contribution. The differences between large and small organizations were of interest.

Kind of action endorsed by those saying government should act:[1]	Number of employees			
	1–19 (N=339)	20–249 (N=430)	250+ (N=504)	Total (N=1273)
	Percent	*Percent*	*Percent*	*Percent*
Mandatory national program	37	43	52	45
Voluntary national program	10	9	8	9
National education program	39	37	39	38
Miscellaneous suggestions	30	32	29	30

[1] Multiple answers permitted.

Attitudes toward Government action expressed by individual industries should be noted here also. It will be remembered that each respondent was permitted 2 answers.

Inspection of the data (p. 120) shows that: (1) Transportation was most often, and the Agricultural industries least often, in favor of a Government-sponsored, mandatory national program; (2) most industry members seemed to expect to retrain their own employees but those having extensive contacts

Industry	Percent of industry advocating government action [1]		
	Mandatory program	Voluntary program	National education program
Agriculture	37	3	39
Forestry/Fisheries [2]	44	0	44
Mining	38	3	38
Construction	42	10	43
Transportation	52	10	41
Communication [2]	38	31	46
Utilities	50	13	20
Wholesale Trade	51	8	37
Retail Trade	34	10	40
Finance	47	10	25
Insurance	51	10	44
Real Estate [2]	53	6	29
Services	46	9	40

[1] Multiple answers permitted.

[2] Percentages based on a number of less than 20 respondents.

with the general public most often wanted help with the reeducation problems.

In summary, half of the total sample thought the government should take action to bring about changes in metric usage in the U.S. Eleven of the 13 industries showed a majority in favor of Government action while 46 percent of those favoring a nationally coordinated program thought that "certain changes should be mandatory." More of the largest companies were in favor of such a program than were to be found in either group of smaller firms.

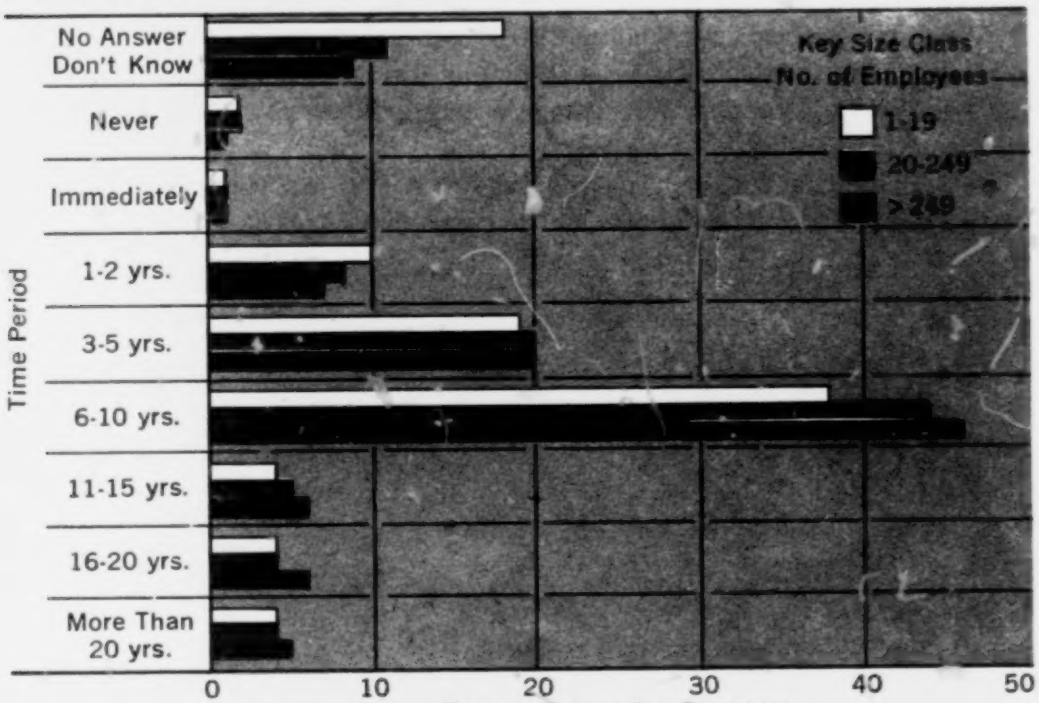
TABLES 88A & B

Q. IV—8 Suppose that you were going to help develop a national plan for adopting the metric system in this country. What kind of time period do you think would be reasonable for making the changeover?

Before being asked this question, respondents were reminded of the list of 8 characteristics that might guide a possible national metrication program. Every respondent had received a printed list of these characteristics through the mail and at the time of the interview they were either read to him again or he was asked to glance at them briefly to remind himself of the contents.

In the light of the 8 hypothetical guidelines for conversion to metric measurement, about 70 percent of all respondents said their companies would find a conversion period of up to 10 years most satisfactory for their operations. Differences between size groups of companies were small.

ESTIMATED REASONABLE TIME PERIOD FOR CHANGEOVER BY WHOLE U.S. (Table 88)



Exporters, owners of foreign licensees or subsidiaries, and current "metric users" were compared with the total sample population on this question.

Reasonable time period for planned national conversion

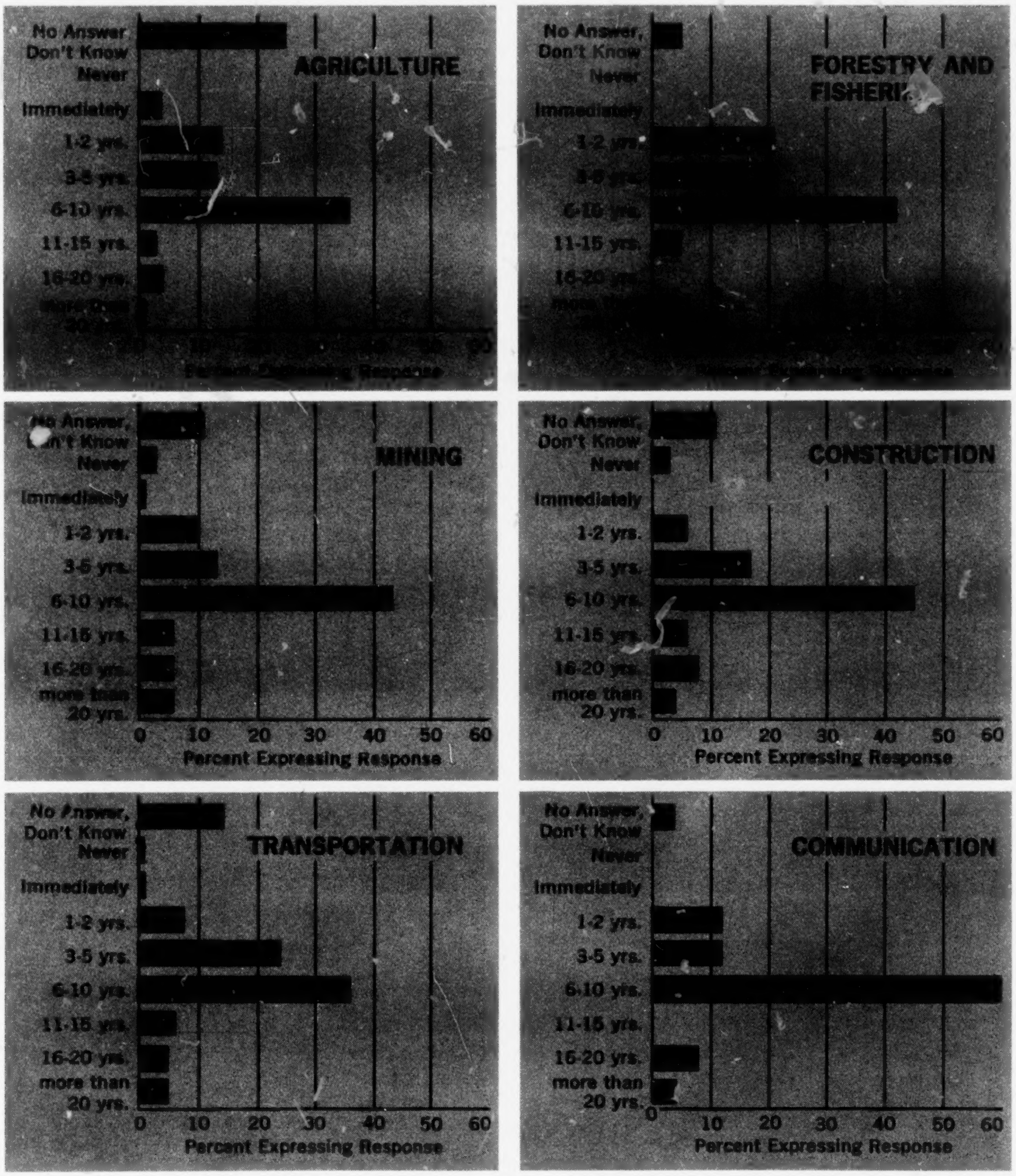
No. of years for conversion	Percent total population "voting" for (N=2563)	Percent exporting firms "voting" for (N=298)	Percent firms with licen/subsid "voting" for (N=291)	Percent firms using metric equip, supp, compon. "voting" for (N=445)
Never	2	1	0.3	0.4
Immediately	1	1	1	1
1–2 years	8	5	7	7
3–5 years	19	17	20	21
6–10 years	42	49	48	48
11–15 years	5	7	8	5
16–20 years	5	6	7	7
More than 20 years	4	7	4	5
Don't Know/No Answer	12	7	5	6

The percentages of firms within each subgroup preferring each time period corresponded closely to those for the total sample. There was a tendency for a slightly higher proportion of firms within these groups to suggest the 6–10 year time period.

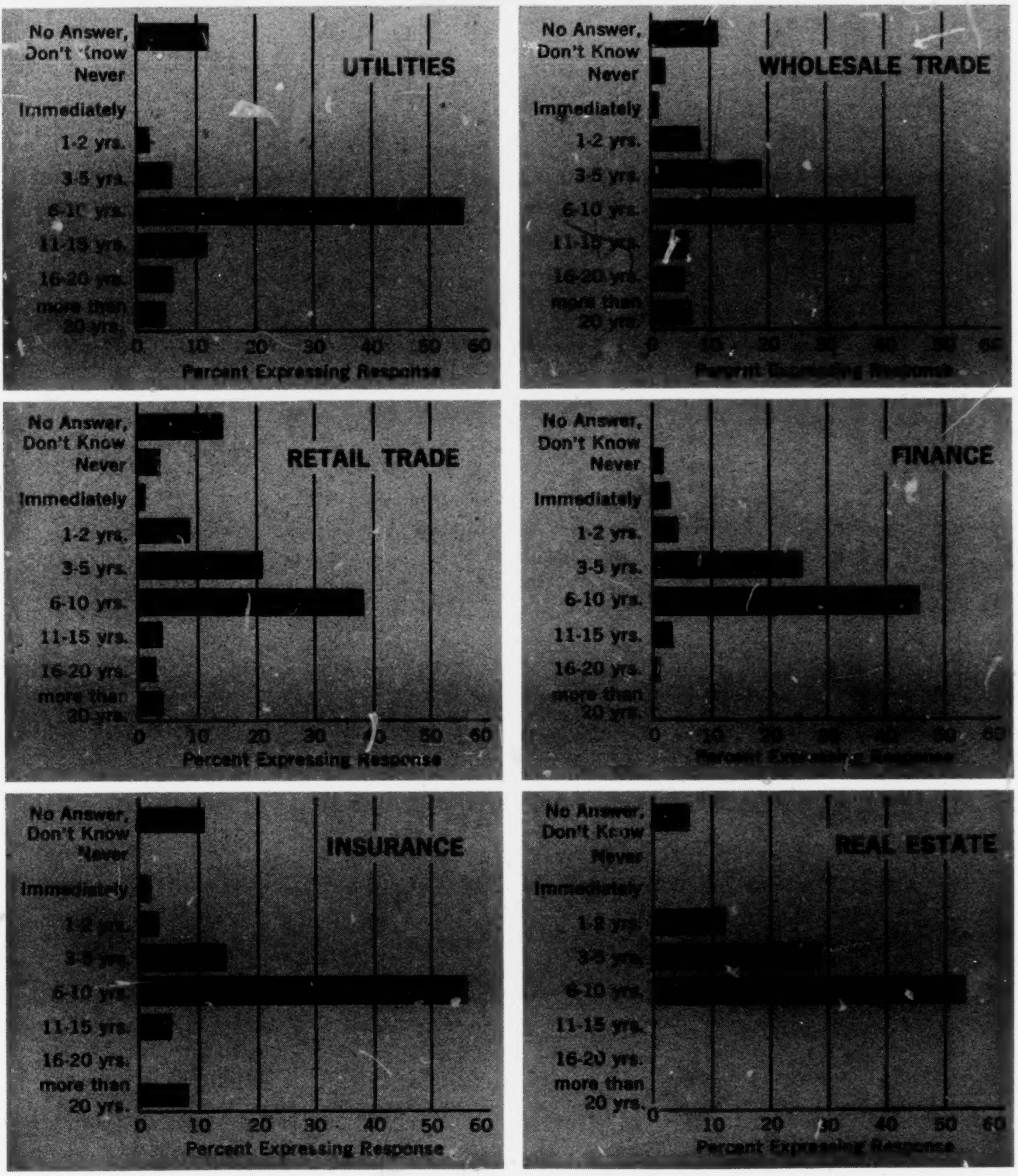
More spokesmen in Agriculture (25%) than in any other industry did not state a definite number of years as optimum for conversion. About 3 percent each in the Construction, Retail and Mining industries were firmly opposed to change at any time.

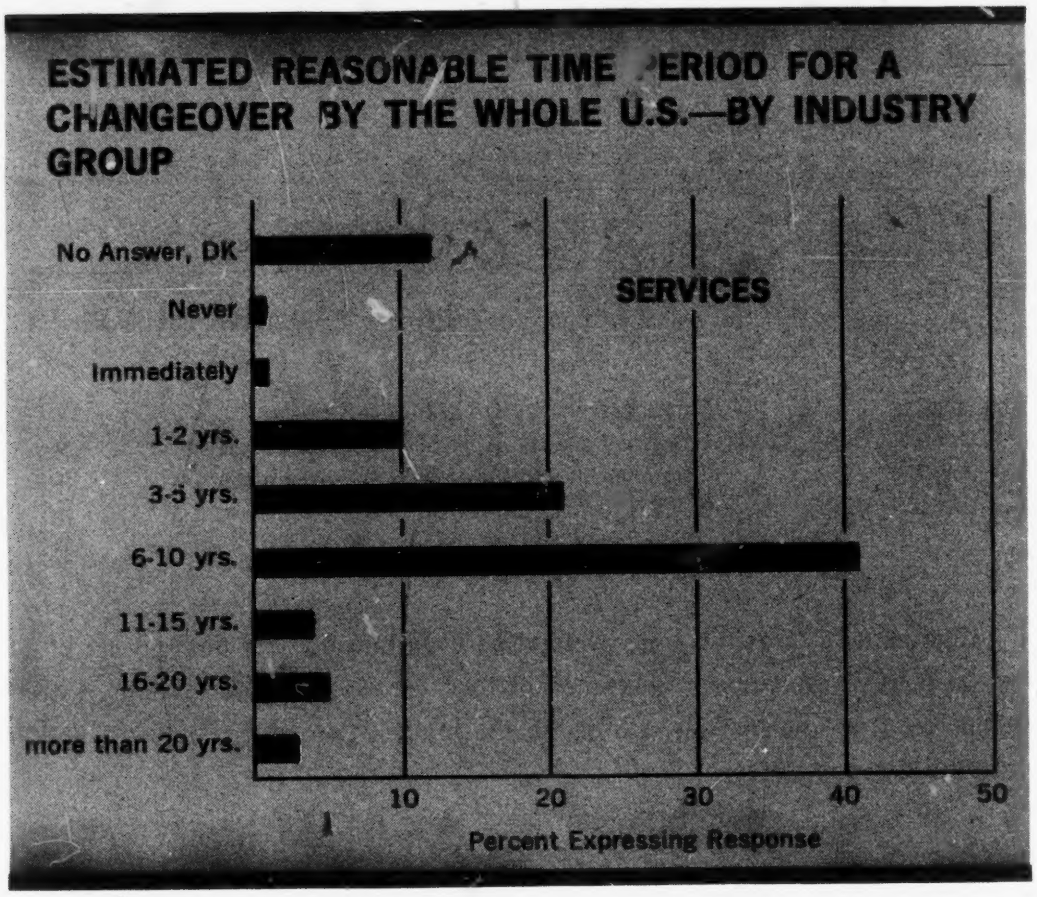
In summary, a 6 to 10 year conversion period was preferred over any other length of time by all groups and all sizes of companies.

ESTIMATED REASONABLE TIME PERIOD FOR A CHANGEOVER BY THE WHOLE U.S.—BY INDUSTRY GROUP



ESTIMATED REASONABLE TIME PERIOD FOR A CHANGEOVER BY THE WHOLE U.S.—BY INDUSTRY GROUP





TABLES 89A, B & C

Q. IV—9 How about a plan for a changeover for your own industry; what time period do you think would be reasonable?

When it came to estimating a "reasonable" conversion period for their own industries, most respondents volunteered a shorter time than the one they considered suitable for the nation as a whole. There were also differences between large and small organization reactions. About 81 percent of the total sample specified one of the 4 time periods shown in the text table below.

Time for own industry to convert	Number of employees			
	1–19	20–249	250+	Total
	Percent	*Percent*	*Percent*	*Percent*
Immediately	37	30	21	29
1–2 years	20	23	18	20
3–5 years	12	17	22	17
6–10 years	10	15	21	15
Total	79	85	82	81
Weighted mean of years	2.35	2.77	3.45	2.86

The industries most and least willing to convert at the above time periods were:

Period	Industry			
	Most mentions	Percent	Fewest mentions	Percent
Immediately	Finance	46	Utilities	14
1—2 years	Forestry/Fisheries	32	Utilities	9
3—5 years	Communications	28	Agriculture	9
6—10 years	Utilities	31	Agriculture	4

"Immediately" was the time preferred for within-industry changeover to SI by the largest number of spokesmen in 8 of the 13 industrial groups. Listed below are the time periods chosen by the highest percentage of firms within each industry:

Industry group	Time period chosen by highest percentage of respondents in that industry	Percent
Finance	Immediately	46
Insurance	Immediately	45
Agriculture	Immediately	41
Services	Immediately	40
Real Estate	Immediately	34
Forestry/Fisheries	Immediately	32
	1—2 years	32
Retail Trade	Immediately	29
Transportation	Immediately	22
	1—2 Years	22
Communications	1—2 years	28
	3—5 years	28
Construction	1—2 years	25
Mining	3—5 years	27
Utilities	6—10 years	31
Wholesale Trade	6—10 years	21

A cross tabulation (table 89C) was performed to permit further comparison of time estimates made for national conversion versus those for changeover within the respondents' own industries. Data again show that, except for those specifying the shortest period for national metrication, spokesmen mostly thought their own industries would be able to move more quickly than the economy at large.

Estimated time for own industry changeover (Base = 2563)	Suggested changeover times for nation		
	Within 5 years (N=741 or 29%)	6—10 years (N=1089 or 42%)	Over 10 years (N=365 or 14%)
	Percent	*Percent*	*Percent*
"Immediately" to 5 years....	94	61	44
6—10 years................	0.3	31	12
Over 10 years..............	1	2	37

An example will help in reading the text table above. When respondents had said they thought a reasonable time period for the whole country to go metric was from "6 to 10 years" (42% of all persons answering), then 61 percent of those who specified that time period said their own industry should be able to convert in "up to 5 years," thus implying they would have fewer problems than the nation overall.

One other figure deserves special mention. A small, but consistent group maintained total resistance to the idea of any metric conversion:

	Number of employees			
	1-19	20-249	250+	Total
	Percent	*Percent*	*Percent*	*Percent*
Nation should never change...........	2	2.4	0.7	1.7
Own industry should never change.....	4.1	2.9	1.5	2.8
Answered "Never" to both Qs.........				1.4

The percentages of firms within each industry which gave a "Never" response for conversion time for their own industries were fairly even with the exception of Forestry/Fisheries, Communications, Utilities, and Real Estate which had *no* firms giving that response.

The text table on page 128 presents the comparison of the total sample population percentages for changeover time within industry with those for the 3 subgroup populations of interest:

Changeover time period	Reasonable time period for planned changeover within industry			
	Percent total population (N=2563)	Percent export firms (N=298)	Percent firms with licensees/ subsidiaries (N=291)	Percent firms using metric equipment, supplies, component (N=445)
No Answer	1	0	2	1
Never	3	1	2	1
Immediately	29	16	18	28
1—2 years	20	16	20	17
3—5 years	17	25	23	23
6—10 years	15	26	20	17
11—15 years	2	4	4	3
16—20 years	2	4	5	4
More than 20 years	2	4	3	2
Don't Know	8	3	3	4

The table above permits easy comparison of the conversion time preferences by special interest groups with those of all respondents for their own industries. In all 3 of the presently metric-associated groups, the optimum changeover time averaged a little longer than was estimated to be "reasonable" by the total population.

In summary, although a 6 to 10 year changeover period was considered most reasonable for the nation as a whole, nearly one-third of the sample thought their own industries could convert "immediately" and 66 percent estimated that it could be done in less than 5 years.

Three special groups which currently have some contact with metric activities (exporters, users of metric equipment, etc.) estimated slightly longer changeover periods than the general sample did for conversion within their own industries.

TABLES 90A, B & C

Q. IV—10 Suppose a national plan were developed so that the whole United States would be metric by the end of a (*NO. OF YEARS IN Q. 8*) year time period. What would be the biggest advantage to your organization of this planned (*NO. OF YEARS*)—year changeover?

Answers to this open-ended question were so scattered that eight reply categories had to be established but reasons suggested by about 33 percent of the total sample were just what might have been predicted. The two largest groups of answers, however, did not actually pertain to the intent of the question. There was little difference by organization size in the numbers of mentions of the various reasons given, except for "encourages international trade." Four times as many large companies (8%) mentioned this as did small ones (2%). These numbers correspond to tables 35A (Export Activities) and 28A (Foreign Licensee or Subsidiary Activities), which show that many more large companies than small engage in foreign commerce.

The text table below shows the proportions of answers assigned to the various reasons offered, as a function of the length of time suggested for the changeover period for the whole country.

Reason for conversion time	Changeover period for nation			
	Those who said within 5 years	Those who said 6–10 years	Those who said over 10 years	Total
	Percent	*Percent*	*Percent*	*Percent*
Suggested				
Would allow time to:				
Convert	7	8	6	7
Re-educate	4	4	4	4
Use supplies	1	2	3	2
Change measuring devices	0.3	0.4	0.3	0.3
These nonsequiturs were also suggested:				
Easier to use	12	13	11	12
Encourages international trade	4	6	4	5
Miscellaneous	14	13	12	13

More than half of all respondents suggested no advantages that might accrue to their organizations, should metrication take place during the time periods they had suggested. More large companies were able to suggest advantages than medium or small companies. Higher percentages of firms in Finance (72%), Insurance (71%), Retail Trade (69%), and Communication (68%) listed *no advantages* to conversion within their recommended time period.

Advantage response category	Industry group having highest percentage of firms within that industry giving response	Percent
None	Finance	72
Allow time to re-educate	Forestry/Fisheries	10
Allow time to use supplies	Agriculture	5
Time to change measuring devices	Forestry/Fisheries	5
Allow time to convert (general)	Utilities	19
	Real Estate	12
Encourage international trade	Wholesale Trade	6
	Services	6
Easier to use	Forestry/Fisheries	16
	Construction	15
Miscellaneous advantages	Wholesale Trade	15
	Mining	12
Don't Know	Retail Trade	5
	Utilities	5

In summary, answers as to why the particular conversion periods they had named would be advantageous to their companies were quite scattered, with many more nonsequiturs than directly appropriate replies. Such a pattern of responses usually indicates "off the cuff" opinions rather than well-structured knowledge of probable events.

TABLES 91A, B & C

Q. IV—11 What would be the biggest disadvantages?

General conversion expense and retraining of their own personnel were the most frequently mentioned disadvantages attendant upon national conversion, but altogether about 55 percent of the population of interest was able to think of some detrimental aspect for their own organizations should the U.S. adopt the metric system. About 37 percent had been able to suggest advantages. Large companies mentioned all categories of disadvantages slightly more frequently than small organizations did, but percentages for nearly all categories were fairly small. The more significant items are listed below:

Disadvantage [1]	Percent of total sample	Industry mentioning most often	Percent
Conversion (general)	16	Construction	23
Retraining own people	14	Construction	22
Expensive	9	Wholesale Trade	15
Cost of new equipment/tools	8	Utilities	17
Re-educating public	8	Real Estate	16
None	45	Insurance	64

[1] Multiple answers allowed.

In general, disadvantages were more frequently perceived in connection with the longer conversion periods:

Perceived disadvantage to conversion in time suggested	Suggested changeover period for nation		
	Those who said within 5 yrs.	Those who said 6–10 yrs.	Those who said over 10 yrs.
	Percent	*Percent*	*Percent*
Too expensive	7	10	13
Cost of new equipment/tools	5	8	12
Confusing to public	6	8	8
Hard to re-educate public	8	8	10
Retraining	13	13	19
Conversion (general)	16	16	19

See table 91C for full detail.

In summary, slightly over half of all respondents mentioned some disadvantage they thought would be associated with conversion to SI. Problems anticipated lay in three general areas:

Hardware/Inventory	12%
People related	17
General	26

More disadvantages were named by those advocating the longer changeover periods, a phenomenon probably related to size of company, since the largest organizations averaged a year longer in their preferred changeover period than the group of smallest firms. (See table 88A.)

TABLES 92–93A, B & C

Qs. IV—12	How about your competition? Would this planned (*NO. OF YEARS*)—year metric changeover have any effect on your competitive position among your chief U.S. competitors?
IV—12a	What effect would it have?

Only a few respondents in all organization size classes could see that there would be any effect on their position among U.S. competitors, if metric measurement were adopted.

	Number	Percent
Would have effect	85	3.4
No effect expected	2324	91.8
Don't Know/No Answer	149	5.8

The effects expected by the 3 percent were mostly negative. Their numbers can be broken down as follows:

Effects expected by the 3% with respect to competitive position with U.S. firms	Number = 85
	Percent[1]
Follow rest of industry	14
Would hurt smaller competitors	11
Costly transition period	11
Costly for firms to change	9
Miscellaneous	51
No Answer/Don't Know	12

[1] Multiple answers allowed.

The Wholesale Trade (6%) and Construction industry (5%) anticipated the most change in their positions amongst U.S. competitors should metric measurement be adopted.

Length of time to convert had little influence on the way spokesmen felt about possible effects on their competitive positions in the U.S., but more of those who thought conversion ought to take "over 10 years" (6%) expected their positions to be affected than those who spoke for shorter times for national conversion (3%).

Some small and medium sized employer groups mentioned that the smaller organizations would be hurt but no large firms mentioned that possibility.

In summary, the overwhelming majority of respondents said that changeover within the time period they had suggested would have no effect on their positions relative to U.S. competition.

Analysis of Qs. 13–16 in Section IV has been omitted because respondents apparently did not discriminate between import of these questions and items 9 to 11 in this section.

TABLES 98–100A, B & C

Qs. IV—17, 17a, 17b

Q 17 Keeping in mind the eight program characteristics, do you think that a national 10-year planned changeover would influence your annual dollar sales?

Q. 17a *(IF YES TO Q. 17, ASK Q. 17a & 17b:)* What do you think the percent change in your annual U.S. dollar sales might be?

Q. 17b *(IF YES TO Q. 17, ASK Q. 17a & 17b:)* How about the percent change in your annual dollar export sales?

When respondents were asked how they felt about the probable health of their annual dollar sales volume, should a planned 10-year metrication program be put into effect along the lines of the eight characteristics listed in the literature sent to them, a majority said:

The 10-year changeover plan:	Percent of total sample [1]
Should *not* affect annual dollar sales	90
Should affect annual dollar sales	6
Don't Know/No Answer	5

[1] Adds to 101 percent due to rounding.

More representatives within the Wholesale (10%) and Retail (7%) Trades expected to have their sales affected than did spokesmen for other industries.

As shown in the text table (p. 132), 6 percent expected that their annual sales would be affected. When this subgroup was queried further as to what they thought the percent change in their annual U.S. sales would be, they mostly thought the change would be an increase.

Change expected—as percent of dollar sales in U.S.	Percent of those expecting U.S. sales to be affected (Number = 143, 6% of total population)				
	By number of employees				
	1 to 19	20 to 249	250+	Percent of sub-population total	Percent of total sample (N = 2563)
An increase of:					
0.5 to 10 percent	33	15	12	20	1.2
11 to 25 percent	12	10	18	13	0.8
25 percent or more	19	8	8	11	0.6
Undetermined	0	6	4	4	0.2
Total	64	38	43	48	2.8
A decrease of:					
0.5 to 10 percent	2	6	4	4	0.3
11 to 25 percent	0	2	0	1	0
25 percent or more	5	4	2	3	0.2
Undetermined	5	8	4	6	0.3
Total	12	19	10	14	0.8
Don't Know	21	29	37	29	3.2

Expectations of either increase or decrease in U.S. annual gross revenue seemed to bear little, if any, relationship to whether the 10-year plan was longer or shorter than the period originally specified by the respondent, but more small business representatives than those from large corporations expected to gain by the 10-year conversion plan:

In annual U.S. dollar sales	Company gross sales/year							
	Under 1 million		1–100 million		100 million to 1 billion		Over 1 billion	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Expected increase	27	2.7	24	2.5	6	2.8	0	0
Expected decrease	6	0.7	8	0.8	0	0	2	2.8

The third question of the series inquired about possible percentage increases or decreases in *export sales* that might attend a 10-year metrication program. Just under 1 percent (N=19) of all respondents (but 9% of the 291 exporters) said they thought their export trade would be affected by such a plan and most of these expected increases in their revenues. The numbers represent too small a group for further analysis here. See table 100A for details.

Within the individual industries, Services and the Wholesale Traders were most frequently optimistic about possibly enhanced foreign trade:

Industry	Percent within industry expecting change in annual dollar export sales with 10-year metric changeover:	
	Increase expected	Decrease expected
Wholesale Trade	4.9	2.7
Services	4.0	0.6
Mining	2.7	0.0
Retail Trade	2.4	0.7
Construction	2.3	0.0
Transportation	2.0	1.2
Utilities	1.6	0
Insurance	1.6	0
Finance	0.8	0
Communication	0	4.0

In summary, about 90 percent of the total sample said they did not anticipate any change in their annual dollar sales as a result of a 10-year changeover to the metric system of measurement, if the plan were to follow the 8 characteristics suggested. Less than 1 percent expected a decrease in revenues, either from U.S. or export sales, while about 3 percent expected an increase in their annual dollar volumes.

The exporter subgroup more often anticipated an increase in foreign sales than did those not now engaged in international trade.

The reader is cautioned that the data on expectations of either increased or decreased annual dollar sales were based on insignificant numbers of respondents. The interpretations may or may not be valid as a result.

TABLES 101–104A & B

Q. IV—18a,b,c	Q. 18	Let's talk about cost now. Do you think a nationally planned 10-year changeover would have any effect on your annual dollar costs? *(IF YES TO Q. 18, ASK Q. 18a-18c)*
	Q. 18a	Could you estimate the percent change in terms of your annual costs?
	Q. 18b	About how long would you expect this change in costs to affect your operation?

Q. 18c Which of the following would you estimate to be the most important factor in your (increase) (decrease) in costs:
Labor Components Other
Equipment Inventory

Dollar sales may be a good index to gross volume of goods or services handled in a year, but the costs attendant upon operations required to effect sales are perhaps a better indication of potential profits. If it can be assumed that most organizations are normally operated in such a manner as to either make a profit or at least break even, then all other things being equal an increase in costs would be detrimental to the economic health of the firm.

A majority of concerns in the population of interest said they did not believe their annual dollar costs would be affected by a nationally planned 10-year changeover to the metric system. There was some difference of opinion by company size class.

A planned 10-year conversion:	Number of employees			
	1 to 19	20 to 249	250+	Total
	Percent	*Percent*	*Percent*	*Percent*
Should affect costs	28	41	50	39
Should not affect costs	66	54	47	56
Don't know/No answer	6	5	3	5

Industry Breakdown of the 39 Percent Expecting Effects on Costs

Industry [1]	Any effect on costs (N=2563)	Percent within industry predicting: (N=1013)				
		Cost increases of		Cost decreases of		Don't know if increase or decrease
		0.5 to 5 percent	Over 5 percent[2]	0.5 to 5 percent	Over 5 percent[2]	
Utilities	61	38	18	0	18	26
Wholesale Trade	53	27	26	0.9	17	26
Mining	52	39	14	1.8	11	34
Construction	48	37	17	1.4	12	31
Transportation	45	25	20	2.6	17	31
Communication [3]	36	56	11	0	0	33
Retail Trade	34	30	20	1.4	8	36
Forestry/Fisheries [3]	32	33	17	0	0	50
Services	30	25	25	4.3	12	31
Agriculture	30	23	17	3.3	7	47
Insurance	26	25	25	0	25	19
Real Estate [3]	25	25	12	0	25	37
Finance	24	17	30	3.3	7	40
Total Sample	39					

[1] Listed in decreasing order of percent within industry predicting effect on costs.

[2] Includes "Undetermined" amount.

[3] Number of firms in that industry expecting any change in costs is less than 10.

If the cost expectancies are broken down into smaller segments of increase or decrease, we find:

Should affect costs by increases of: (in %)	Percent firms expecting costs to be affected (Number = 1013, 39 percent of Total)
0.5 to 5	30
6 to 10	10
11 to 25	6
Over 25	5
Undetermined amount	11
Total	62
By decreases of:	
0.5 to 5	2
6 to 10	1
11 to 25	0.3
Over 25	0.6
Undetermined amount	1
Total	5
Don't Know whether increase or decrease	31

Medium and large business representatives mentioned increases of 5 percent or less more frequently than small business spokesmen did.

Inspection of the above text table yields the information that several times more respondents expected increases than decreases in costs as a result of change to metric measurement but one-third said they didn't know what kind of cost change to expect.

The text table shows 4 industry groups in which approximately 50 percent or more of the firms within the industry predicted that a nationally planned 10-year changeover would affect their annual dollar costs: Utilities, Wholesale Trade, Mining and Construction. In each of these 4 industries, more than 45 percent of those who expected a change in costs predicted an increase, 13 percent or over predicted a decrease, and at least a quarter of the group did not know what would happen. Transportation, Insurance and Real Estate also expected decreases in costs that exceeded the percentage for the total sample population for this question. There was no industry group, however, in which the percentage of firms predicting a decrease in costs was greater than the percentage of firms predicting an increase.

There were two groups in which the percentage of firms unable to designate the *direction* of the predicted change in costs approached 50 percent: Forestry/Fisheries and Agriculture. In all groups except Insurance (19%) more than one-fourth of the respondents who expected a change in costs could not say whether the change would be an increase or a decrease.

It may be useful to look at the opinions of companies when they are classified by level of annual gross dollar sales. As was pointed out in the introduction to this report, number of employees is not an infallible indication of company size. The reader is cautioned, however, to remember that this analysis is being made on just those respondents who expected an effect on costs (39% of the total sample).

It should be noted that only three of the 167 firms with gross dollar volume of $100 million or more which anticipated an effect on costs, expected any decrease in costs with metrication.

Of Those Predicting Effect on Costs [1]

Prediction	Gross sales level in dollars							
	Under 1 million (N=316)		1 to 100 million (N=449)		100 million to 1 billion (N=115)		Over 1 billion (N=52)	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Increase in costs	197	62	312	69	73	63	29	56
Decrease in costs	14	4.5	22	4.9	2	1.7	1	1.9
Don't Know	105	33	115	26	40	35	22	42

[1] N = 932 rather than 1013 due to "Don't Know" and "Refused to Answer" responses from 9 percent of the total sample who could, therefore, not be classified for Gross Sales. See Table 102D for complete figures.

The breakdown by originally suggested time period for changeover did not present any striking differences from the proportions cited above. The 23 respondents who were opposed to changeover at any time were more doubtful as to the actual change in costs expected. A slightly greater percentage of those who said the changeover could occur in 5 years or less expected decreases in costs. More than ⅔ of the "Increased Costs" category, below, is made up (in every group except "Never") of respondents who said either that costs would increase 5 percent or less or that costs would increase by an undetermined percentage.

Of Those Predicting Effect on Costs [1]

	Originally Suggested Changeover Period			
	Within 5 Years (N=253)	6–10 Years (N=428)	10+ Years (N=225)	Never (N=23)
	Percent	*Percent*	*Percent*	*Percent*
Increased costs	61	64	64	52
Decreased costs	7	5	1	4
Don't Know	30	29	33	35

[1] N = 928 rather than 1013 due to respondents who could not be classified as to originally suggested changeover period. See table 102C for complete figures.

The large percentages of "Don't Know" responses and "Increase-Amount Undetermined" responses again point out the uncertainty of the respondents with respect to the degree of effect on costs metrication might bring. These two categories accounted for nearly 40 percent of respondents in all suggested changeover time-period groups.

The text table below is based on the 39 percent (N=1013) of the total population of interest who thought their costs would be changed by a nationally-planned 10-year conversion. It will be noted that the majority thought that cost changes due to metrication would affect their companies for 10 years or less (69%). Thirty-six percent thought they would last 4 years or less.

The 39 percent: Number of years change in costs would affect company operations	Percent subsample (N=1013)
Less than 1	8
1	9
2	8
3	7
4	4
5—7	11
8—10	22
More than 10	7
Don't Know	19
No Answer	4

A later probe to clarify whether respondents thought the percentage of increase would apply to *each* year of the period of effect or would be spread *over the entire* period, showed:

	Percent
Estimated cost increase should be divided by number of years in metrication changeover	83
Estimated cost increase was for *each* year of metrication changeover (no "% change in cost" estimate exceeded 2% for respondents in this group)	17

If, for example, a company specified it expected a 5 percent increase in costs over a 10 year period, the representative was actually saying he estimated that costs would be affected by only 0.5 percent, or one-half of 1 percent, for any *1* year of the metrication program. The majority of respondents were, therefore, expecting a maximum rise of between 0.5 percent and 1 percent a year in their dollar costs during a limited span of time, if SI were to be adopted nationally.

Of the 39 percent (N=1013) of the total population which predicted altered costs with a nationally planned 10-year changeover, only a little over half (53%, N=542) were able to estimate the magnitude and direction of this change with a percentage figure based on annual costs. The table following deals only with that portion (50%, N = 507) which stated a specific increase in costs as shown below. It will be noted that the number of estimators of "0.5 to 5 percent increase" was at least 3 times as large as any other.

Number of years increase in costs is expected to affect company operations (N = 507)	Percentage of respondents predicting increase in costs as shown:			
	+0.5 to 5 percent (N = 295)	+5 to 10 percent (N = 100)	+11 to 25 percent (N = 65)	More than 25 percent (N = 47)
0—1 years	24	17	15	8
2—4 years	25	26	13	22
5—7 years	11	13	15	11
8—10 years	23	26	35	28
10 years +	6	4	9	15
No Answer/Don't Know	10	14	11	15
Totals [1]	99	100	98	99

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[1] Do not always add to 100 percent due to rounding.

Inspection shows that for all increase levels a majority of firms predicted company operations would be affected for some period up to 10 years.

The subsample of 507 companies (about 20% of total sample) which predicted specific percentages of increase in costs as a result of metrication, can be further analyzed by employer size and number of years they thought the costs would continue:

Estimated Number of Years Company Operations Might be Affected by *Increased* Costs Due to Metrication (N = 507)

Years of effect	Number of employees							
	1–19		20–249		>249		Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Less than 1	10	8	16	9	16	8	42	8
1	19	16	19	11	23	11	61	12
2	12	10	20	11	23	11	55	11
3	8	7	17	10	15	7	40	8
4	8	7	9	5	7	3	24	5
5—7	13	11	26	15	23	11	62	12
8—10	20	16	40	23	70	33	130	26
10+	8	7	11	6	15	7	34	7
Don't Know/No Answer	23	18	17	10	19	9	59	12
Total	121	100	175	100	211	100	507	100

A few entrepreneurs (N=35, or 1.4% of total sample) said they expected that a planned metrication program would decrease their costs. This group was so small that analysis is relatively meaningless, but a table will be presented in order that these spokesmen may have "equal time" with those anticipating increased expenses.

Estimated Number of Years Company Operations Might be Affected by *Decreased* Costs Due to Metrication (N = 35)

No. of years of effect	Number of employees							
	1–19		20–249		>249		Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Less than 1			1	5	1	9	2	6
1			1	5			1	3
2			1	5	1	9	3	8
3	1	17	2	11			3	8
4			1	5	1	9	2	6
5—7			2	11	1	9	3	8
8—10			1	5	2	18	3	8
10+	1	17	2	11	2	18	5	14
Don't Know/No Answer	4	66	7	39	3	27	13	37
Total	6	100	18	100	11	100	35	100

Companies Stating that Cost Increase Will Affect Company Operations for 8 to 10 Years

Gross sales level	Number	Percent of size class [1]
Under $1 million (N=316)	48	15
1 to 100 million (N=449)	111	25
100 million to 1 billion (N=115)	36	31
Over 1 billion (N=52)	23	44
Percent of total sample (N=2562)	229	9
Percent of subsample expecting cost change (N=1013)		23

[1] N = 220 rather than 229 because some firms were not classified according to gross sales.

"Labor" was named most frequently as the reason for increased or decreased costs by the 39 percent who expected a national metrication program to affect their annual expenses. Replacement of equipment was the next most frequently mentioned factor. "Components" was also mentioned by a large proportion of respondents.

Factors responsible for effects on costs (as named by the 39 percent expecting changes)	Percent of expecters only [1] (N = 1013)	Percent of total sample (N = 2562)
Labor	33	13
Equipment	20	8
Inventory	9	8
Components	16	6
Miscellaneous	19	8

[1] Multiple answers permitted, adds to more than 100 percent.

By industry, of those most often expecting cost changes, the factor of greatest import was said to be:

Of Those Within Each Industry Expecting Change in Costs, Percent Citing Each Important Factor

	Equipment	Labor	Components
Construction	8	55	18
Real Estate [1]	12	62	0
Finance	23	40	10
Insurance	19	31	12
Communications [1]	11	11	33
Retail Trade	22	29	15
Services	23	34	18
Transportation	23	27	16
Wholesale Trade	19	24	16
Mining	18	29	21
Utilities	13	31	15
Agriculture	50	20	7
Forestry/Fisheries [1]	17	0	33

[1] Fewer than 10 firms in that industry expected a change in costs.

The breakdown of entrepreneur opinions by dollar volume of annual sales closely parallels the data for employer size groups but was preferred for presentation below because it shows clearly the concern for equipment obsolescence among the largest corporations.

Reason for effect on costs as given by the 39 percent expecting cost changes (N = 1013)	Percent by gross dollar sales			
	Under 1 million	1–100 million	100 million to 1 billion	Over 1 billion
Labor	31	36	30	21
Equipment	23	18	18	27
Inventory	7	10	10	13
Components	18	14	16	17

In summary:

A majority of the total sample (56%) thought that a 10-year nationally planned conversion to the metric system should have no effect on their costs of operation.

Of the 39 percent who stated positively that conversion to SI would have an effect on their annual dollar costs:

- A majority expected the effect to be an increase in expenses (61%) with from 0.5 to 5 percent being mentioned most often;
- A few (less than 5%) expected a decrease in costs;
- Medium and large firms expected increased costs more frequently than small concerns;
- Estimations of added costs were expressed as percentages of total annual dollar costs for the complete period of changeover, not on a year by year basis;
- Those who had originally stated that changeover to metric measurement ought to take *more* than 10 years, more often thought their costs would be higher with a nationally planned changeover of 10 years;
- A majority of those who expected increased costs due to conversion thought company operations would be affected for less than 10 years;
- The reasons most often given for the expected change in costs of operation were labor, equipment and components—in that order.
- The industries most often anticipating a rise in costs with a 10-year planned conversion (in terms of the total sample populations within each industry) were Utilities (45%), Wholesale Trades (36%), Mining (34%), Construction (32%) and Transportation (28%).
- Labor costs were mentioned most frequently by Construction, Real Estate and Finance representatives (in terms of the respondents within each industry who said costs would be affected.)
- The large proportion of "don't know" (what level of costs to expect) answers given by the 39 percent who said they expected effects on costs, leads the analyst to think that there may have been at least some "viewing with alarm" by many of these respondents with consequently elevated cost estimates. Disinclination to make a change from the present system was probably expressed as concern over attendant costs, at least in some industries.

TABLES 105–106A, B, C & D

Qs. IV—19, 19a

Q. 19 Would such a changeover affect your selling price?

Q. 19a (*IF YES TO Q. 19*) About what percent increase or decrease in unit price might you expect?

Only a little over half (22%) as many firms expected to have to change their selling prices as anticipated changes in costs (39%).

Effect on selling price	Number of employees			
	1 to 19	20 to 249	250+	Total
	Percent	*Percent*	*Percent*	*Percent*
Would affect selling price	19	22	27	22
No effect on price	73	72	68	71
No Answer/Don't Know	8	6	5	6

The above text table shows that more large employers felt they would probably have to change price as a consequence of metrication than would small companies.

The breakdown of this question by size of company based on gross dollar sales again emphasizes the point that the larger the company, the more frequently any new costs would be passed on to the consumer:

A change in costs:	Gross dollar sales				
	Under 1 million	1–100 Million	100 Million + 1 billion	Over 1 billion	Total sample
	Percent	*Percent*	*Percent*	*Percent*	*Percent*
Would affect selling price	19	25	26	46	22
No effect on price	74	70	68	51	71
No Answer/Don't Know	6	5	5	3	6

In every industry a decided majority said a nationally planned 10-year changeover would have *no* effect on the selling prices of their goods, but the Wholesale Trades and Utilities industry most often expected to make up any added costs by passing them on to the customers:

Industry	Should *not* affect selling price [1]	Should affect selling price [1]
	Percent	*Percent*
Wholesale Trade	61	34
Utilities	59	33
Construction	65	32
Mining	65	30
Forestry & Fisheries	68	26
Retail Trade	69	24
Transportation	71	22
Services	78	16
Agriculture	76	11
Real Estate	88	9
Communications	88	8
Insurance	87	7
Finance	94	3

[1] Percent of own industry.

Percents to make 100 are to be found in No Answer/Don't Know categories

Those who either suggested that conversion should take more than 10 years or who did not want it to happen at all, more often thought their selling prices would be affected by the change to metric measurement. Firms holding these two opinions comprised only 7 percent (N = 175) of the total sample population.

If further analysis is made of the 22 percent of the total sample who thought their selling prices would be affected by the costs attendant on metrication, we find that over half of the group expected these prices to go up, a few thought they might go down, but over one-third could predict neither the direction nor the magnitude of possible change. These proportions closely paralleled those expressed with regard to changes in cost as a result of metrication, except that only half as many expected to change their selling prices as anticipated increases in costs of operation. The large number of "Don't Know" responses to both cost and selling price questions probably indicated that much of the remaining data gathered was based on opinion rather than actual computations. In any event, about half of those organizations which forecast increased costs apparently expected to absorb these increases to keep their prices competitive.

For those companies stating that they would pass the costs on, the up-to-5 percent level was most often specified as being the likely rise in price for the consumer. Relatively equal percentages of employers by size class were represented within each possible increase or decrease percentage level.

Level of increase or decrease expected in unit selling price:	Proportion of the 22 percent expecting effect on selling price
	Percent
Increase:	
0.5 to 5 percent	26
6 to 10 percent	13
11 to 25 percent	8
25 percent or more	5
Undetermined	10
Total (increase)	62
Decrease:	
0.5 to 5 percent	0.7
6 to 10 percent	0.9
11 to 25 percent	0.3
25 percent or more	0.3
Undetermined	0.3
Total (decrease)	2.5
Don't Know/No Answer	35

In the table (p. 145) are listed the 13 industry groups with the percentage in each that foresaw selling price changes as a result of metrication. It will be noted that in all industries only a minority of the total sample for that group expected selling prices to increase. The "Don't Know" column shows one remarkable figure—not one organization in the Real Estate business ventured a guess as to what might happen to selling prices for real property.

Percents Within Each Industry Group Reacting to Possible Price Change

Industry	Percent predicting change in selling price	Percent predicting		Don't Know
		Increase	Decrease	
Wholesale Trade	34	22	2.1	10
Utilities	33	27	—	9
Construction	32	22	—	11
Mining	30	15	—	15
Forest/Fisheries	26	21	—	5
Retail Trade	24	13	0.4	9
Transportation	22	14	—	8
Services	16	10	0.7	5
Agriculture	11	6	1.0	5
Real Estate	9	—	—	9
Communication	8	4	—	8
Insurance	7	5	—	—
Finance	3	3	—	2

The favored estimate of selling price rise was in the range of 1 to 5 percent. Only in the Forestry/Fisheries, Construction and Wholesale industries were there appreciable numbers of organizations estimating price rises greater than the lowest range but less than 10 percent of the members in each of these groups made such predictions.

In summary, only a minority in each industry expected to have to change their selling prices as a result of a planned national 10-year conversion to SI. Of the 39 percent who expected changes in cost of company operations as a result of metrication, just about half expected to pass the costs on to the consumer by raising selling prices. A majority of the total sample (71%) did not anticipate having to make any change in the selling prices of their goods.

Possible price rises forecast by the minority were mostly expected to be below 5 percent. Spokesmen for companies having over $1 billion in annual sales most often (46%) said that metrication would have an effect on the prices charged to their consumers.

TABLES 107–109A, B & C
110–112A & B

Qs. IV—20,21,22,23,23a,

Q. 20 Would any of your employees have to be retrained if the United States were to go metric? *(IF YES TO Q. 20, ASK Q.* 21-23a)

Q. 21 About what percent would have to be retrained?

Q. 22 What do you think it might cost your company on the average to retrain an employee?

Q. 23 How does this compare with the costs for originally training an employee?

Q. 23a Then you think that it would require just as long to retrain your personnel in the new system of measurement as it took to teach them their job skills in the beginning?

Over 60 percent of the organizations in the population of interest said it would be necessary for them to retrain their employees to use metric measurement if there were national changeover to SI. The larger employers more frequently claimed they would have to cope with this problem:

	Number of employees			
	1 to 19	20 to 249	250+	Total
	Percent	*Percent*	*Percent*	*Percent*
Would need to retrain employees	49	63	70	60
No retraining needed	48	35	28	37
No Answer/Don't Know	3	2	2	2

In only 3 industries did a majority of spokesmen say that retraining would *not* be a significant issue:

	Percent of industry saying *no* retraining needed
Finance	62
Agriculture	54
Communications	52

All other industries showed a majority expecting that retraining would be necessary. The leaders of this group were Utilities with 80 percent, Construction with 76 percent and Wholesalers with 72 percent of the representatives foreseeing educational efforts for at least some employees.

The following analysis will deal only with the 60 percent of all respondents who stated that retraining of employees would be necessary if SI were adopted in the U.S.

With the advent of SI, 1551 employers (60% of sample) said from less than 1 percent to 100 percent of their personnel would have to be retrained Large organizations had the highest representation on nearly all levels. In the table below the percentages of employees seen as candidates for retraining have been grouped but the message is still clear:

Percent of employees requiring retraining:	Number of employees			
	1–19 (N=415)	20–249 (N=540)	250+ (N=595)	Total (N=1551)
	Percent	*Percent*	*Percent*	*Percent*
0—5	6	9	12	9
6—30	8	20	25	18
31—99	15	22	26	22
100	66	43	31	45
No Answer/Don't Know	6	5	6	6

Within industries, the proportions varied widely for employees said to need retraining. In the table below is presented an ordered list of educational requirements along with the industries most often naming each needed level. In the Finance group, for example, 64 percent of the respondents said that none (0%) of their employees would have to be retrained in order to do their jobs, but only 37 percent of the total survey sample estimated that no (0%) reeducation would be necessary.

Percent Firms Stating a Certain Percent of Employees Would Require Retraining

Percent employees requiring retraining	Percent total sample specifying level	Principal industries specifying this level	Percent total sample within industry specifying this level
0	37	Finance	64
		Agriculture	57
>0—5	6	Insurance	14
		Forestry/Fisheries	10
6—10	4	Communications	12
		Mining	10
11—20	4	Communications	8
		Mining	7
21—30	3	Utilities	8
		Agri.; Forest/Fisheries; Wholesale Trade	5
31—50	5	Forestry/Fisheries	16
		Utilities	9
51—75	3	Utilities	8
		Wholesale	6
76—99	4	Construction	8
		Mining; Transport; Wholesale Trade	6
100	27	Wholesale; Retail	32
		Transport; Utilities	30

Consistent with their previous position on the metrication issue, those firms suggesting the longest time for conversion also expected to have to retrain the largest proportions of their employees. Only the 100 percent retraining level is presented below to illustrate this point:

Changeover Time Period Originally Suggested by this Group

	Within 5 yrs. (N=741)	6–10 yrs. (N=1089)	More than 10 yrs. (N=365)	Never (N=46)	Total [1] (N=2563)
	Percent	*Percent*	*Percent*	*Percent*	*Percent*
Expect to retrain 100 percent of employees	24	25	38	41	27

[1] Respondents in the 4 changeover time period groups do not add to 2563 due to firms who gave no answer when asked to suggest a changeover time table.

Retraining is a problem with numerous ramifications. In an industry such as Construction, where all skilled and semi-skilled workmen constantly use measurements, reeducation to a practical application level would be an urgent problem. In other industries, such as Finance or Insurance, employees already work almost entirely with a decimal system and have little need to use physical measurement in their work. In addition, the original instruction given to persons using measurements regularly is often more oriented toward the techniques of making the measurements and the reasons why they are needed than to the mechanics of manipulating the measurement units. These latter factors often constitute the main thrust of industrial on-the-job training.

Training is often so gradual that employers don't have precise ideas of how much it really costs. A carpenter, for example, usually starts as an apprentice, but works at those portions of the job he is able to do while learning his craft. He will probably take five or so years to become a skilled artisan. What did his training cost? His employer has only a general idea.

The respondents in this survey said these kinds of things indirectly in the answers they gave to the interviewers. When asked what they thought it might cost their companies to retrain their employees to use the metric system, the majority simply said they didn't know. This same feeling is present in other tables pertaining to the training situation and the analyst is pretty nearly faced with a dichotomy—employers knew original training had cost either very little or a good deal, with sums in between appearing to be scattered. Employers in all size classes estimated much the same costs for training individuals regardless of which cost level they had specified. For this reason, only "Total" percentages will be quoted on the following page.

Estimated cost to retrain an employee:	Percent of firms expecting to have to retrain any employee (60% of total sample) (N=1551)
$1—25	9
$26—29	5
$100—199	6
$200—299	3
$300—499	2
$500—999	4
Over $1000	8
Don't Know/No Answer	62

By industry those employers who expected to have to retrain but said they didn't know how much it would cost, ranged between a low of 42 percent for Forestry/Fisheries and a high of 73 percent for Agriculture. The industry most frequently saying that the cost per employee would be "over $1000" was Construction.

Those respondent companies where spokesmen had originally specified the shorter periods of time for conversion to metric measurement, apparently had fewer employee retraining problems. A higher percentage of the short conversion people than of any other group said they would have to do *no* retraining (about 40 to 45%) and a lower percentage of them gave "Don't Know" answers to the question of dollar cost for any reeducation that might be necessary (see table 109C).

It was appropriate to ask how the estimated costs of retraining employees compared with the amounts originally expended to educate personnel for their jobs. Differences by size of employee groups were not appreciable, so only totals are shown in the following text table:

Cost of retraining compared to original investment:	Percent of sample [1] (N=1551)	Percent industry saying this most often: [1]	
Little compared to original cost	10	Finance Communications	20 17
Less	20	Utilities Finance	35 32
Same	11	Agriculture Retail Trade	23 13
More	16	Forestry/Fish Services	33 19
Twice as much	2	Agriculture	4
Don't Know/No Answer	40	Real Estate Agriculture Forestry/Fish	66 43 49

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[1] Of those who said retraining would be necessary.

Opinions within industries as to the price of retraining compared with the original training expenditures were, of course, divided, but those with obviously less need for measurement did estimate lower retraining cost levels. Nearly all industries had some small percentage of estimates at each of the categories in the preceding table.

Thirty-eight percent of the subsample that thought retraining would be needed said that it would take the same length of time as the original instruction had required.

In summary, 60 percent of all respondents—a majority in all but 3 industries, predicted their employees would have to be retrained in order to carry out their work. The number of employees requiring tutoring ranged from less than 1 percent to 100 percent of the staff with more small organizations saying that all of their workers would have to be reeducated. In general, those firms expecting to have to retrain the higher percentages of employees also suggested that conversion take place over a longer period of time.

Retraining costs appeared to be largely guess work by respondents, with values clustered in the relatively low dollar categories. Those willing to convert in the shortest periods of time apparently expected to have to do the least retraining. Evidence presented in this series of tables validates information given in answer to Q. 18c (table 104A) where "Labor" was specified by 33 percent of the sample as being the most important factor in increased costs attendant upon conversion to SI.

TABLES 113–114A & B

Qs. IV—24, 25
Q. 24 How many persons are employed in your organization on the average?
Q. 25 What were your approximate gross sales or gross dollar volume for the 1969 business year?

Size of organization as indicated by number of employees, placed a small majority of firms (57%) in the "under 100" staff size categories. It should be remembered, however, that number of employees is a fallible index since the more highly automated industries have few personnel in relation to the amount of work performed.

A series of histograms is presented on pages 151–155 showing the percentages of employees and of gross annual sales within each industry for the categories specified. The graphic form permits ready comparison of the two sets of data and a more nearly accurate estimate of the proportion of each industry in the sample population.

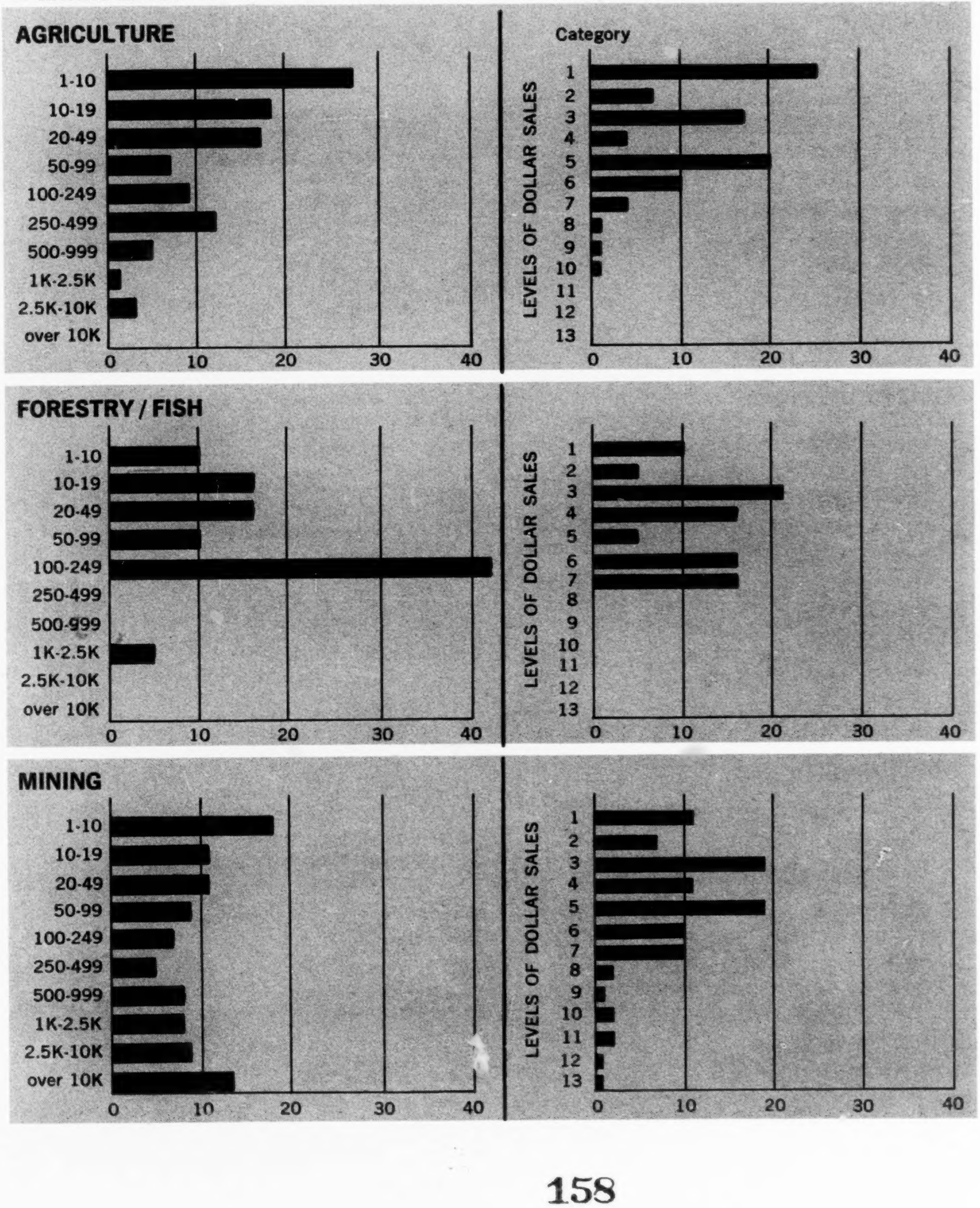
In the figure for tables 113B and 114B, respondent's organizations by industry are compared for number of employees and gross annual dollar sales. The shapes of the two profiles compare reasonably well, but do not correspond exactly. Industries which contain the giant organizations contrast clearly with those comprised largely of small firms.

Questions 24 and 25 were asked to permit gathering of information which would define the respondent population as exactly as possible.

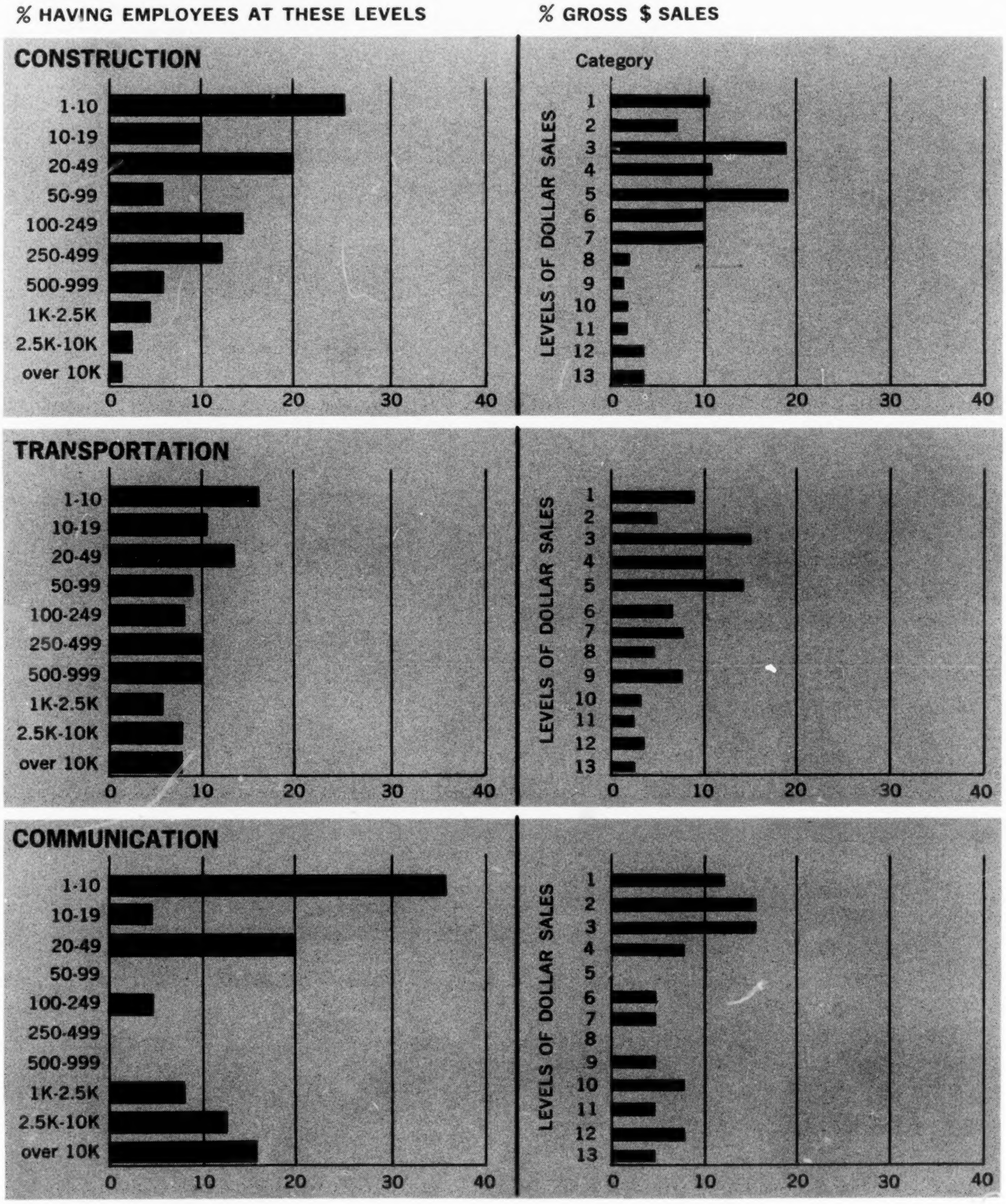
SIZE DISTRIBUTION OF FIRMS (BY INDUSTRY GROUP) BY NUMBER OF EMPLOYEES AND BY ANNUAL GROSS DOLLAR SALES (TABLES 113 AND 114)

% HAVING EMPLOYEES AT THESE LEVELS

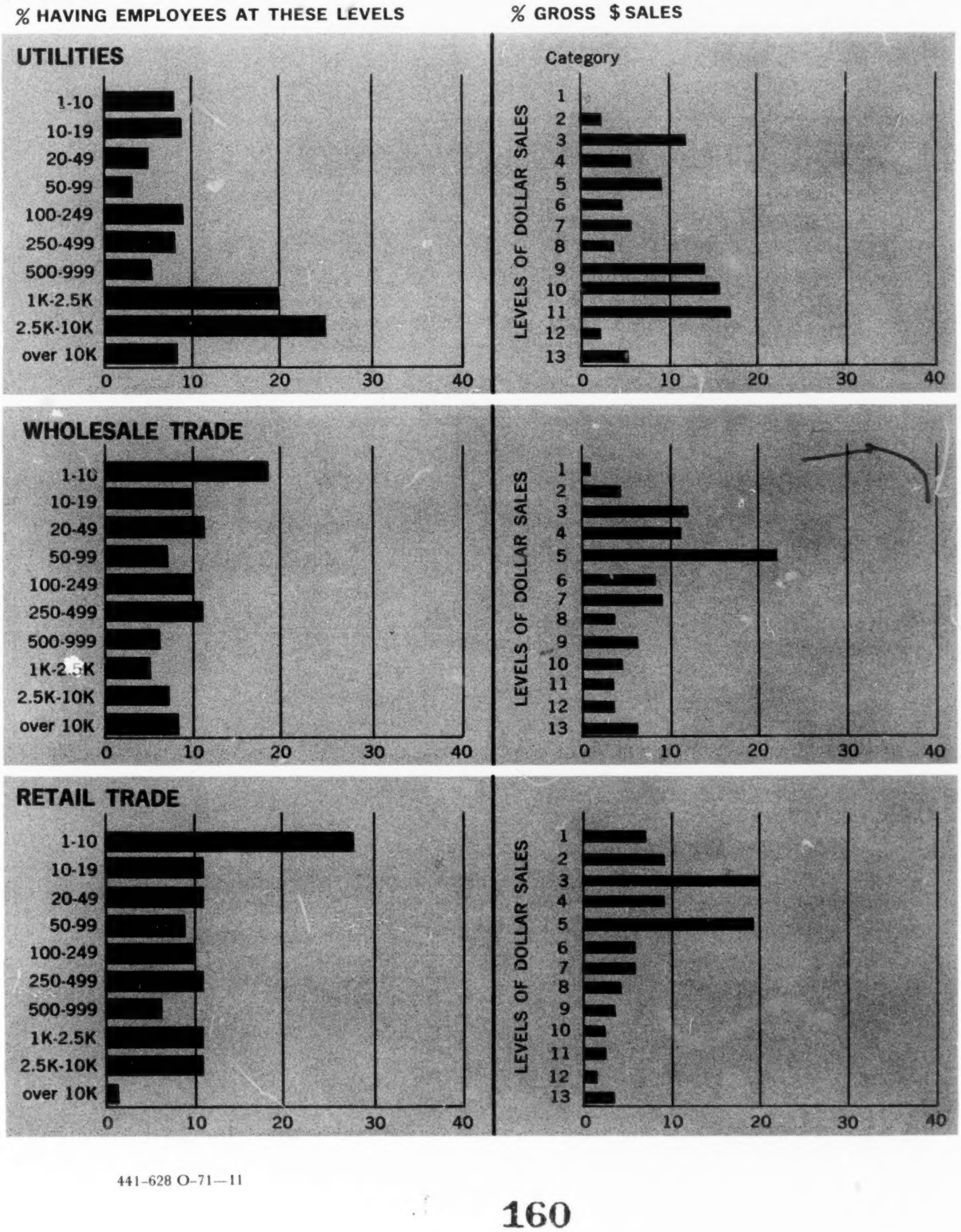
% GROSS $ SALES



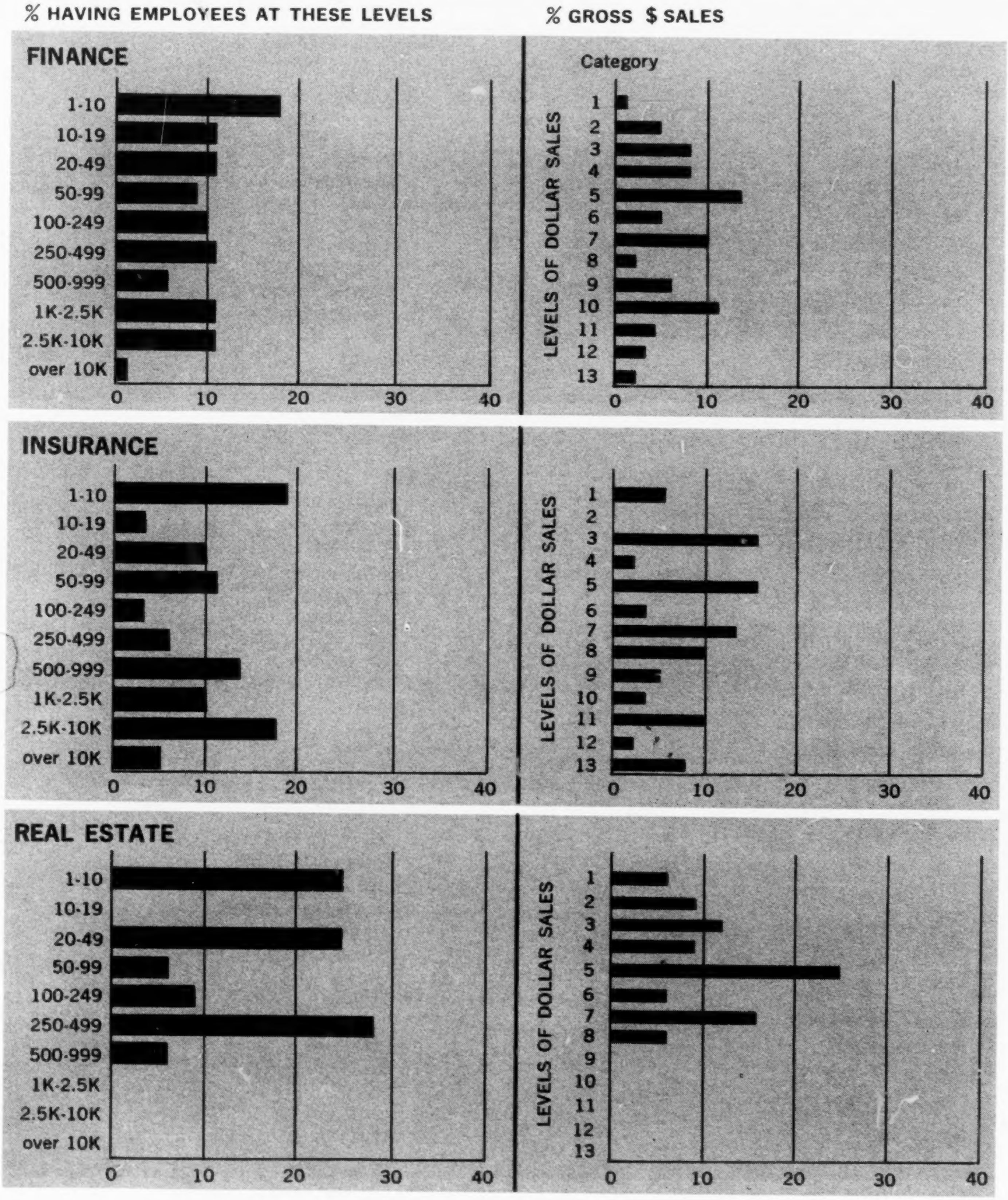
SIZE DISTRIBUTION OF FIRMS (BY INDUSTRY GROUP) BY NUMBER OF EMPLOYEES AND BY ANNUAL GROSS DOLLAR SALES (TABLES 113 AND 114)



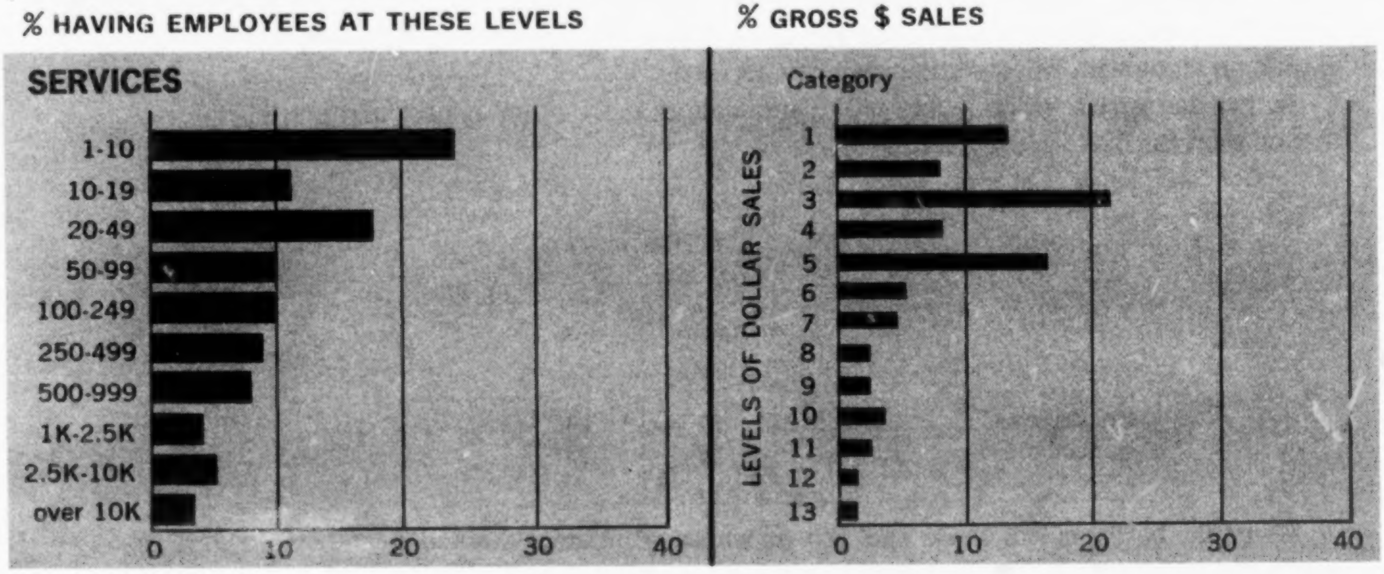
SIZE DISTRIBUTION OF FIRMS (BY INDUSTRY GROUP) BY NUMBER OF EMPLOYEES AND BY ANNUAL GROSS DOLLAR SALES (TABLES 113 AND 114)



SIZE DISTRIBUTION OF FIRMS (BY INDUSTRY GROUP) BY NUMBER OF EMPLOYEES AND BY ANNUAL GROSS DOLLAR SALES (TABLES 113 AND 114)



SIZE DISTRIBUTION OF FIRMS (BY INDUSTRY GROUP) BY NUMBER OF EMPLOYEES AND BY ANNUAL GROSS DOLLAR SALES (TABLES 113 AND 114)



TABLES 115A, B & C

Q. IV—26 Which of the following choices most closely indicates the current attitude of *your company* toward increased metric usage in your operations?

Three questions were common to both this survey and the Manufacturing Survey. These questions were believed to be of special significance in determining overall attitudes toward national adoption of metric measurement. They also served to establish a common denominator between manufacturing and nonmanufacturing survey data.

The 3 questions attempted to determine:

1. What the attitudes of the respondents' companies were toward increased metric usage and how strongly they felt about it, i.e., would they be willing to changeover; (Q. 26)
2. Whether they thought it was in the best interests of the country to adopt SI (Q. 27); and
3. If it were decided that metric measurement should be adopted, what kind of national changeover policy should be used—a planned or evolutionary policy; a mandatory or totally voluntary program. (Q. 28)

Answers to the first of these questions showed nearly half of the total sample carefully taking a neutral position on the issue, with just about equal representation from all employer sized groups (see histograms, p. 157).

Those in the neutral category indicated through extra comments made to the interviewers that their organizations realized the costs that would be involved in converting to a new measurement system, but they were not willing to stand against a trend that might possibly improve the national economic position. They were, simply, willing to let others make the decision, those to whom the issue was perhaps more critical. The neutral group implied they would go along with whatever the majority decided.

In two industries, respondents spoke appreciably more often against metrication than for it—

	Percent of industry	
	Against	For
Construction	37	24
Agriculture	28	23

As might be expected, those spokesmen whose companies wanted to take more than 10 years for conversion were also most frequently "strongly against" any increase in use of metric measurement by their own organizations (25% of their group).

In an attempt to see if certain special characteristics relative to metric usage or foreign commerce had some relationship to company attitude, three subpopulations were compared with the total sample: (1) all exporting firms, (2) all firms having licensees or subsidiaries in foreign countries, and (3) all firms making significant use of equipment, supplies, or components described in metric units or designed to metric standards.

Company Attitude Toward Increased Metric Usage in Own Operations

	Percent total population (N=2563)	Percent export firms (N=298)	Percent firms with licensees/ subsidiaries (N=291)	Percent firms using metric equipment, supplies, components (N=445)
Strongly for	13	12	14	26
Mildly for	17	26	22	27
Neutral	43	31	42	32
Mildly against	12	16	10	8
Strongly against	14	12	10	6
Don't Know/No Answer	0.7	1	1	0.8
Totals [1]	100	98	99	100

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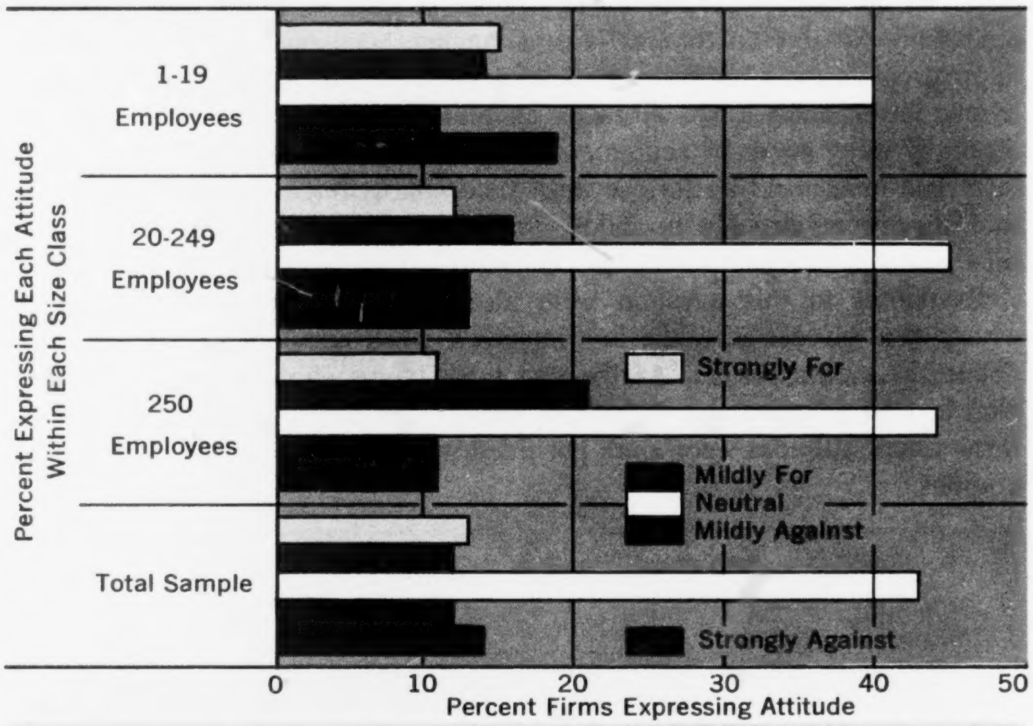
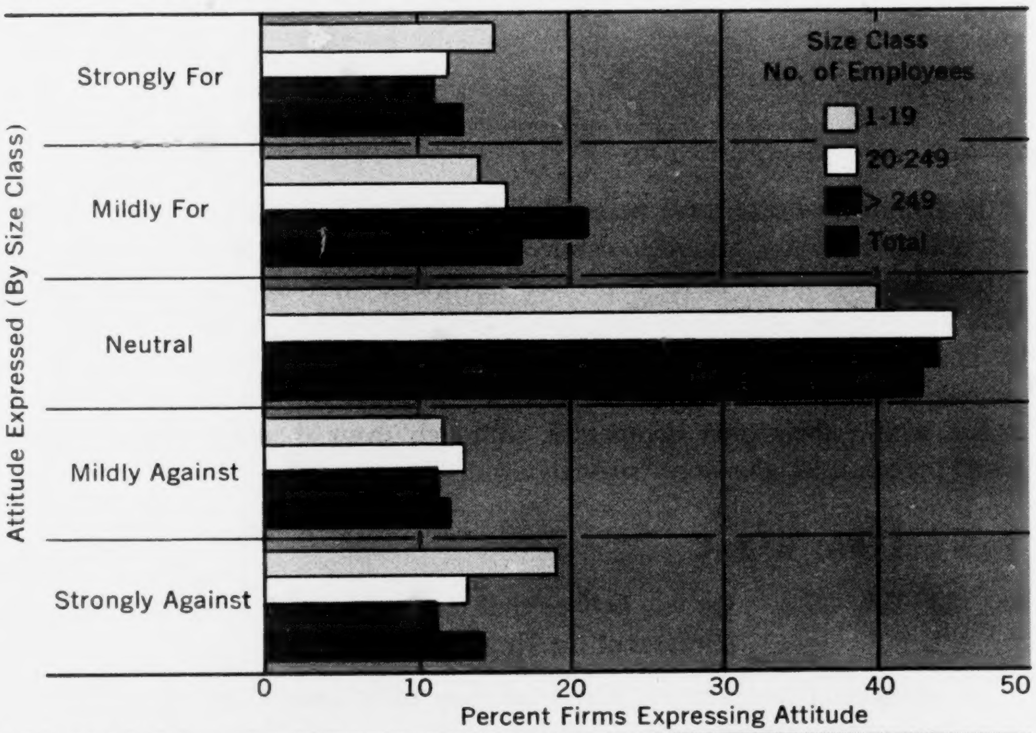
[1] Total may not add up to 100 percent due to rounding.

ATTITUDES TOWARD INCREASED METRIC USAGE WITHIN OWN COMPANY (Table 115)



COMPANY'S ATTITUDE TOWARD INCREASED METRIC USAGE WITHIN OWN COMPANY (Table 115)



All three of the subgroups shown on page 156 differed from the total population in company attitudes toward increased metric usage. Exporters and "metric users" had fewer firms in the neutral category and more firms expressing favorable attitudes. Firms having licensees or subsidiaries had approximately the same proportion of neutral firms as the total sample population; fewer unfavorable attitudes expressed. The group of firms which is currently using goods or equipment designed to metric standards or described in metric units, held by far the most favorable attitudes: a majority (53%) said they were strongly or mildly for increased metric usage in their own operations as compared with the 30 percent of the total population.

Responses to this question were also cross-tabulated with the answers which were given during the first interview when respondents were asked to define the metric system. As the text table below shows, those respondents who had given acceptable definitions ("full" or "partial") tended to be from firms where attitudes were more positive toward metric usage in company operations.

Company attitude toward increased metric usage	Percent having given each definition of metric system [1]				
	Full (N=307)	Partial (N=1553)	Incorrect (N=115)	Don't know (N=513)	Total sample (N=2563)
Strongly for	18	15	15	4	13
Mildly for	25	19	20	9	17
Neutral	35	42	37	49	43
Mildly against	10	12	8	15	12
Strongly against	11	12	20	22	14
Don't Know/No Answer	1	1	0	1	1

[1] Not included is "No Answer" to Q. I-3.

In summary: Forty-three percent of the total sample remained noncommittal about company attitudes toward increased metric usage in their own firms. Slightly more firms expressed favorable attitudes than unfavorable ones.

Those firms which had more knowledge of and/or experience in using the metric system were much more favorably inclined toward increasing metric usage within their own companies, although even these groups contained small percentages who were "strongly against" this policy.

TABLE 116A, B & C

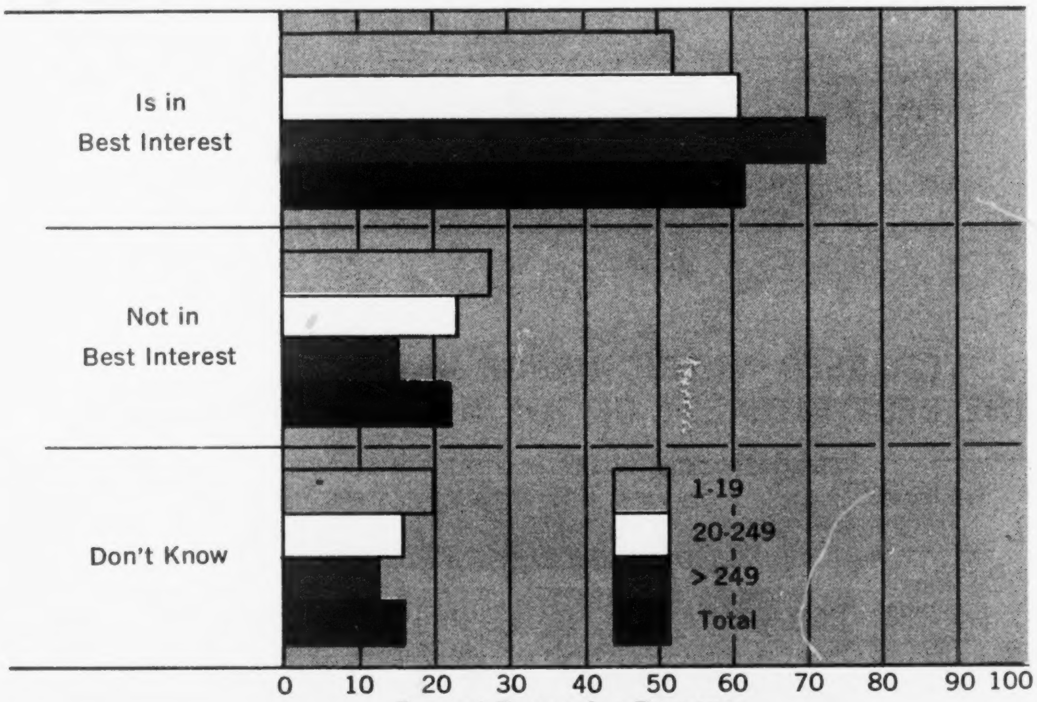
Q. IV—27 Do you believe that increased metric usage is in the best interests of the United States?

A substantial majority of the population of interest stated they believed that increased usage of metric measurement was in the best national interest.

Large employers said this significantly more often than small employers, but the majority opinion was favorable toward national metrication in all employer size classes.

Believe increased metric usage is:	Number of employees			
	1–19	20–249	250+	Total
	Percent	*Percent*	*Percent*	*Percent*
In best interests of U.S	52	61	72	61
Not in best interests of U.S	27	23	15	22
Don't Know/No Answer	20	16	12	16

PERCEIVED "BEST INTEREST" OF U.S. IN TERMS OF INCREASED METRIC USAGE (BY SIZE CLASS) (Table 116)

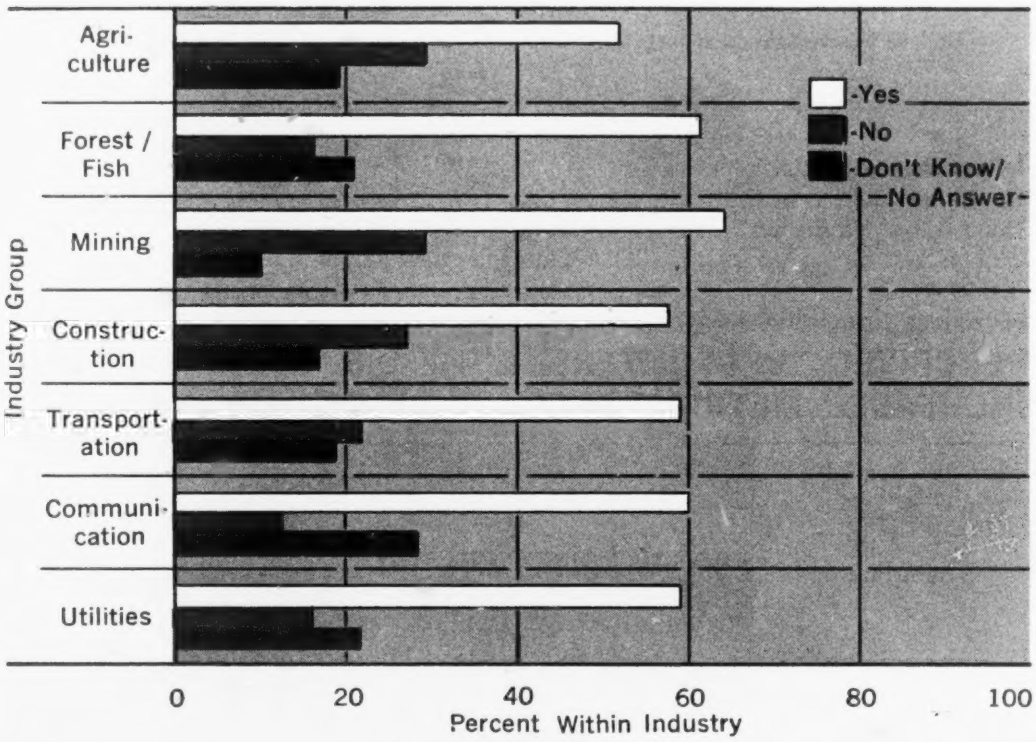


A majority in all industries supported the idea that increased metric usage was best for the nation. The range of endorsement levels is shown below:

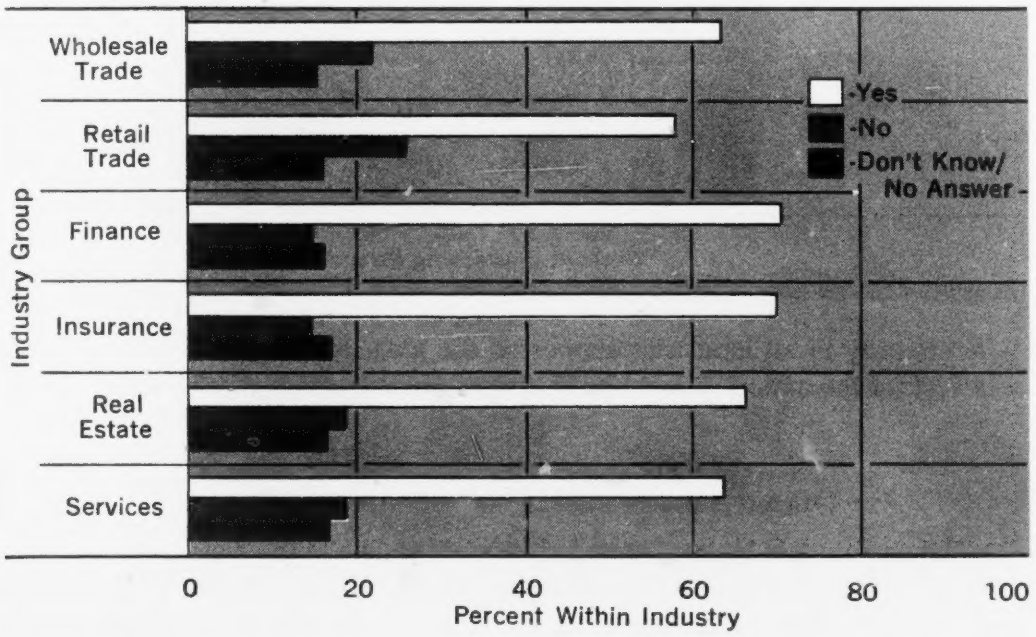
	%
Lowest plurality—Agriculture	52
Highest plurality—Finance	71

The percentages by individual industry are shown in the histograms on page 160. It will be noted that Construction representatives showed a 57 percent majority who believed increased metric usage was in the best interests of the U.S., even though they had been the most opposed of any group to increased use of metric measurement within their own industry (see table 115B).

IS INCREASED METRIC USAGE IN THE BEST INTEREST OF THE U.S.?



IS INCREASED METRIC USAGE IN THE BEST INTEREST OF THE U.S.? (BY INDUSTRY)



Each of the three subgroups had higher percentages of firms which believed that increased metric usage is in the best interests of the U.S. than did the total sample population. All three also had much smaller percentages of firms which gave "Don't Know" responses. Those firms which had foreign licensees and subsidiaries and those currently using metric goods and equipment stood out with approximately ¾ or more of each group advocating increased metric usage for the U.S.

Is Increased Metric Usage In The Best Interest of The U.S.?

	Percent total population (N=2563)	Percent export firms (N=298)	Percent firms with licensees/ subsidiaries (N=291)	Percent firms using metric equipment, supplies, component (N=445)
Is in best interest	61	70	74	79
Not in best interest	22	22	16	13
Don't Know/No Answer	16	7	10	8
Totals [1]	99	99	100	100

[1] Total may not add to 100 percent due to rounding.

Again, those firms where designated respondents had exhibited greater knowledge about the metric system expressed more favorable opinions about use of the metric system in the U.S. The differences between these groups are quite striking:

Is increased metric usage in best interests of U.S.–	Percent having given each definition of metric system [1]				
	Full (N=307)	Partial (N=1553)	Incorrect (N=115)	Don't know (N=513)	Total sample (N=2563)
Yes	75	67	59	38	61
No	13	19	25	35	22
Don't Know	11	13	14	27	16
No Answer	0.1	0.4	0.2	0.4	0.2

[1] Not included is "No Answer" to Q. I–3.

In summary, a majority of firms in all size classes and in all industry groups said that they felt increased metric usage is in the best interests of the United States. More than ⅔ of the members of each of the special interest groups with the greatest knowledge of metric measurements and the greatest contacts with metric countries expressed this opinion.

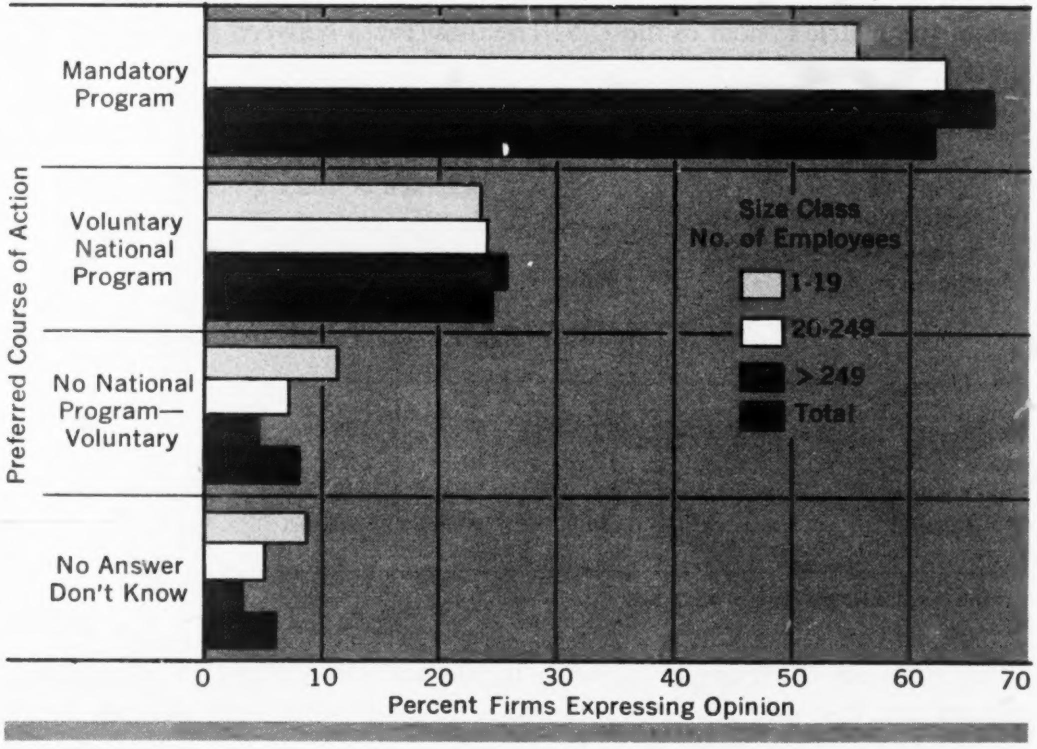
TABLE 117A, B & C

Q. IV—28 If it is found that metric usage is in the best interests of the U.S., which of the following courses of action, in your opinion, is preferable?

All employer size groups showed a majority preferring a mandatory rather than a voluntary national metrication program.

Type conversion	Number of employees			
	1–19	20–249	250+	Total
Mandatory national program	57	63	67	62
Voluntary national program	23	24	26	24
Voluntary only, no national program	12	7	4	8

PREFERRED COURSE OF ACTION IF METRIC USAGE IS FOUND TO BE IN THE BEST INTERESTS OF THE U.S. (BY SIZE CLASS) (Table 117)



No industry in this sample recorded a majority in favor of anything but a mandatory national program. Inspection of the figure for table 117B (p. 162) will show that:

In favor of mandatory national conversion programs	Industry & Percent	
Lowest pluralities	Agriculture	57
	Forestry/Fisheries	58
Highest plurality	Insurance	74

Those who said "Never" to metrication "voted" most frequently for a totally voluntary changeover with no national program. Only 11 percent of this group conceded that increased use of metric measurements was in the best interests of the U.S. The "Never" group, it will be remembered, was constituted of 44 spokesmen, or less than 2 percent of the population surveyed. These respondents were concentrated in the Wholesale and Retail Trades and the Construction industries.

The three subgroups of interest were again compared with the total sample population in the text table below.

Preferred Course of Action if Increased Metric is Found to be in Best Interests of the U.S.

	Percent total population (N=2563)	Percent export firms (N=298)	Percent firms with licensees/ subsidiaries (N=291)	Percent firms using metric equipment, supplies, component (N=445)
Mandatory (legislation)	62	63	67	67
Coordinated national program	24	27	23	24
Totally voluntary	8	6	6	6
Don't Know/No Answer	6	4	4	3
Totals	100	100	100	100

The proportions of respondents expressing each opinion were remarkably similar among these three special subgroups and also to the proportions found in the total population. Despite the large differences in attitude expressed in the two previous questions, all groups favored a mandatory program based on legislation, if metrication should come.

The text table below shows the cross-tabulation of "metric definition" with the responses to this question. Again, the most knowledgeable groups express the total population response with greater intensity.

If increased metric usage is in best interests, what course of action–	Percent having given each definition of metric system[1]				
	Full (N=307)	Partial (N=1553)	Incorrect (N=115)	Don't know (N=513)	Total sample (N=2563)
National program (mandatory)	68	65	57	52	62
National program (voluntary)	23	25	28	21	24
No national program—voluntary	5	6	8	14	8
Don't Know	2	3	7	11	5
No Answer	1	0.1	0	2	1

[1] Not included are "No Answer" to Q. I-3.

In summary, more than three-fourths of the total sample favored nationally planned metrication over a totally voluntary evolution. A majority of all size classes and industries said that if the U.S. goes metric, there should be a mandatory national policy to that effect.

Appendix A

METHODOLOGY AND SAMPLE

A. SAMPLE SELECTION

The original sampling plan identified 98 types of nonmanufacturing firms at the two or three digit SIC (Standard Industrial Classification)[1] level. These firms were located in the following major industry groups:

Agriculture, Forestry, and Fisheries
Mining
Construction
Transportation, Communication, and Utilities
Wholesale and Retail Trade
Finance, Insurance, and Real Estate
Services

By combining similar categories, the original 98 types of firms were reduced to 87 sample groups. An equal number of firms was to be contacted within each sample group and within each of three size categories:

1. Small firms (1–19 employees).
2. Medium-sized firms (20–249 employees).
3. Large firms (250 or more employees).

With the population of interest thus generally defined, the problem of identifying a representative number of respondents both within each Division and with relation to the economy at large, was approached by using the *Statistical Abstract of the United States.*[2] Some redefining of industry alignments was appropriate with identification of representation in the population so the following list of thirteen groups became the basis for the analysis by industries:

Table 1. Breakdown of Sample by Industry Group Representation

	Percent of total sample		*Percent of total sample*
Agriculture	3.9	Wholesale Trade	16.6
Forestry/Fisheries	0.7	Retail Trade	16.4
Mining	4.2	Finance	4.8
Construction	11.8	Insurance	2.4
Transportation	10.1	Real Estate	1.2
Communication	0.9	Services	24.2
Utilities	2.5		

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[1] *Standard Industrial Classification Manual,* U.S. Bureau of the Budget, Washington, D.C.; Government Printing Office, 1967.

[2] *Statistical Abstract of the United States,* U.S. Government Printing Office: Washington, D.C., June, 1969.

Although a sample of 1,500 firms would have been sufficient to represent nonmanufacturing industry in the U.S., a much larger number was chosen to insure the adequate representation of all SIC sample groups. In 84 of the sample groups a total of 30 firms was to be contacted, 10 in each size category. The three groups in which there was an exception to this procedure were No. 1 (Agricultural production) in which 90 interviews were to be obtained, No. 8 (Building) in which there were to be 45 firms, and No. 27 (Electric and Gas Utilities) which was to contain 60 firms. Thus, the total hypothetical sample consisted of 2,715 companies. A breakdown of the 87 sample groups can be found in table 2.

With a universe of about 11 million organizations eligible for inclusion in the survey, the only source where a satisfactory proportion of the total population of interest was available was the Social Security Administration. In the SSA files all establishments which employ one or more persons are listed. Samples of just names, addresses and number of employees in the taxable organizations can be drawn only for government-sponsored, nonregulatory research purposes if proper security can be assured. The SSA provided a basic sample of 28,184 establishments proportional to predetermined representational requirements.

A primary stratified sample of 2,828 firms was randomly selected from the 28,184 firms in the SSA sample. To this primary sample were added 40 railroads, since SSA files do not include railroads, for a total of 2,868 sample units (table 2). In addition, a secondary sample of 2,258 firms was randomly selected as a source of replacements for refusals, firms which had gone out of business, etc.

B. INTERVIEWING PROCEDURE

1. Interview method.—Due to the complexity and volume of information desired from each respondent, the use of a mail questionnaire was obviated. Some type of personal contact was regarded as necessary. Since cost considerations ruled out a personal, face-to-face interview, the most feasible approach entailed the use of telephone interviews.

In order to optimize both respondents' cooperation and the receipt of the desired information, the actual interviewing procedure was divided into four phases.

Phase I.—A letter, signed by the Secretary of Commerce, was mailed to the president of each of the sample firms. This letter explained the intent of the Metric Study and stressed the importance of participation by the respondent firm. It also asked the president of the company to designate an individual within the firm (preferably the highest officer of the firm with the necessary technical information) to handle all further contacts regarding the survey. Accompanying this letter was an information sheet on the Metric Study and a reprint of an article on the Metric Study which had appeared in the August 10, 1970 issue of *Time Magazine*.

Phase II.—Within 3 weeks of the mailing of the Phase I material a telephone call was placed to the office of the president of the organization. The

Table 2. Breakdown of Primary Sample by SIC Sample Group and Company Size

SIC sample group	SIC's included in group	Number of employees			
		Total	1–19	20–249	250 or more
1	01	90	30	30	30
2	07	33	13	10	10
3	08, 09	27	10	11	6
4	10	32	10	11	11
5	11, 12	30	10	10	10
6	13	31	10	11	10
7	14	31	10	11	10
8	15	46	16	15	15
9	161	30	10	10	10
10	162	30	10	10	10
11	171	30	10	10	10
12	172	36	10	12	14
13	173	33	13	10	10
14	174	32	11	10	11
15	175	36	12	12	12
16	176	41	19	10	12
17	177, 178, 179	31	11	10	10
18	412	30	10	10	10
19	411, 413, 414, 415, 417	30	10	10	10
20	422, 423	33	10	10	13
21	421	30	10	10	10
22	44	30	10	10	10
23	45	30	10	10	10
24	46, 473, 474, 478	30	9	10	11
25	471, 472	31	10	10	11
26	48	30	10	10	10
27	49	63	20	23	20
28	501	30	10	10	10
29	502	33	12	10	11
30	503	31	11	10	10
31	504	30	10	10	10
32	505	34	10	11	13
33	506	33	11	12	10
34	507	30	10	10	10
35	508	31	10	11	10
36	5091	41	19	12	10
37	5092	39	10	18	11
38	5096	32	10	10	12
39	5097	32	11	11	10
40	5098	32	10	12	10
41	5093, 5094, 5095, 5099	30	10	10	10
42	521	31	10	10	11
43	522, 523, 524, 525	32	11	10	11
44	53	31	11	10	10
45	54	30	10	10	10
46	551, 552, 553, 559	33	11	11	11

Table 2. Breakdown of Primary Sample by SIC Sample Group and Company Size—Continued

SIC sample group	SIC's included in group	Number of employees			
		Total	1–19	20–249	250 or more
47	554	30	10	10	10
48	56	30	10	10	10
49	57	32	10	11	11
50	58	31	11	10	10
51	591	32	11	10	11
52	592	30	11	16	3
53	596	34	14	11	9
54	596	39	18	12	9
55	593, 594, 595, 598, 599	30	10	10	10
56	60	30	10	10	10
57	61	31	11	10	10
58	62	31	10	11	10
59	63	34	14	10	10
60	64	34	11	13	10
61	65	30	10	10	10
62	66	15	7	5	3
63	67	32	10	10	12
64	70	31	11	10	10
65	721, 722, 725, 726, 727, 729	30	10	10	10
66	723, 724	26	10	10	6
67	731	41	18	12	11
68	732, 733	41	19	11	11
69	734	29	10	9	10
70	7391, 7397	26	5	10	11
71	7392, 7398	31	11	10	10
72	7393, 7394, 7395, 7396, 7399	30	10	10	10
73	751, 752, 754	33	10	11	12
74	753	24	11	10	3
75	762	24	10	10	4
76	764	34	15	18	1
77	763, 769	30	10	10	10
78	781, 782	29	5	13	11
79	783	43	19	12	12
80	79	30	10	10	10
81	806, 807, 809	32	11	11	10
82	801, 802, 803, 804	35	10	10	15
83	81	33	10	11	12
84	84	34	10	10	14
85	891	35	14	11	10
86	892, 893, 899	31	10	11	10
87	40	*40	2	5	13

* Twenty railroads had no size listed.

interviewer asked to speak to either the president or his designated representative. At that time Section I of the questionnaire was administered. The purpose of this section was to determine the level of awareness of and attitudes toward, the metric system. Only rarely did the first interview exceed 10 minutes in length.

At the conclusion of the interview the interviewer informed the respondent that, within 4 or 5 days, he would receive further information regarding the metric system. Also, the interviewer made an appointment to complete the remainder of the interview which would follow receipt of the informational materials.

Phase III.—Immediately following the initial interview, respondents were mailed a packet containing the following items:

1. A letter which confirmed the appointment for the second interview and which stressed the confidentiality of the information to be requested;
2. A list of the question areas which would probably be covered in the second interview;
3. An attractive fact sheet which explained the metric system.

Phase IV.—At the time of the appointment respondents were again telephoned and Sections II, III, and IV of the questionnaire were administered. These sections covered present metric usage and the anticipated effects of future U.S. conversion to the metric system. This portion of the interview generally took from 15 minutes to 1 hour to complete.

Prior to the beginning of the main study the procedure and the questionnaire were pretested among 36 respondents located in Washington, D.C. and Denver, Colorado. The important procedural changes which resulted from that pretest were (1) a revision of the introductory letter, (2) the inclusion of the *Time Magazine* article, and (3) some revision in the explanatory materials.

Some duplication of interviews is known to have occurred both between the Manufacturing and Nonmanufacturing Surveys, and between industry groups in the nonmanufacturing survey alone. Large corporations usually have several different kinds of activities and, since these are represented in Social Security files by separate units, the total company may have numerous listings in the SSA files. Although the basic activity is often manufacturing, an entire family of other activities may have been added to perform services for the central industry. For example, an automobile manufacturer may own raw materials producing units, parts fabrication and assembly plants, a distribution and transport system for the finished products, marketing services, schools for mechanics, and other nomanufacturing peripheral activities. Many of these will be listed under separate SIC numbers.

Other kinds of large organizations may have no central core of manufacturing but nonetheless have a complete line of activities from production to consumer. A chain of food stores may own farms, hatcheries, canneries, deep freeze plants, trucking lines, merchandising divisions, building design groups, training schools for managers, etc., all as part of the basic retail food market business. Again, each of these units may be listed separately in Social Security Administration Files under separate SIC numbers.

To avoid as much duplication as possible, all interviewing was carried out with a spokesman at the Central Corporation offices who had been designated as representative for the entire company. In many cases the headquarters office issued a directive instructing subsidiary units that if calls were received relative to the metric survey, they were to be referred to the general headquarters for reply. Because communication is always somewhat less than perfect, however, some organizations did give more than one interview, most of which were weeded out later in the course of editing final questionnaires. In those cases where multiple interviews were not detected, the representative had at least been instructed to speak from the point of view of his own local, relatively independent activities.

C. SELECTION OF INTERVIEWING LOCATIONS

The large number of interviews, both initial and follow-up, in addition to the wide geographic dispersion of the sample, dictated the use of WATS (Wide Area Telephone Service) lines. In order to minimize the costs of such lines, three interviewing locations were established.

Since *a priori,* subjective judgment indicated that roughly 40 percent of the sample would be located on the East Coast, an office was opened in Washington, D.C. and five WATS lines were installed there. The Western portion of the U.S. was covered from the Denver office of Bickert, Browne, Coddington, and Associates.

Preliminary estimates indicated that approximately 25 percent of the sample might be found west of the Great Plains Area. Therefore, three WATS lines were installed in Denver.

A third interviewing location was established in Cedar Rapids, Iowa, in order to fill the gap in coverage between the East and West Coasts. An interviewing service, Research Data Corporation, was utilized at that location. Although it was initially calculated that 35 percent of the sample might be located in the Midwest, it was estimated that approximately 10 percent of the Midwest could be interviewed from the Denver and Washington locations. For that reason only two WATS lines were installed in the Cedar Rapids office. Unfortunately, slightly more than halfway through the study the Cedar Rapids firm encountered internal problems which prevented them from completing the last 325 interviews. These interviews were then allocated to the two remaining interviewing locations.

D. SELECTION AND TRAINING OF INTERVIEWERS

Although the ability of the interviewers to obtain and complete the interviews was consistently high, the method of selecting interviewers differed from location to location. In Washington eight of the 11 interviewers used throughout the project were either senior law students or recent law school graduates. All but two of the interviewers were males. The Cedar Rapids staff consisted of five professional market research interviewers, all women. The Denver interviewing staff had little homogeneity. Three of the 12 interviewers had prior market research experience. Nine of the 12 were women.

All interviewers used on the project were trained by supervisors from Bickert, Browne, Coddington & Associates. The first 10 days of interviewing in each location were monitored and suggestions given regarding the technique of obtaining the interview and the use of the questionnaires. Later in the project when it became necessary to hire new interviewers, they first spent 3 to 4 hours listening to other interviews on the telephone, in addition to receiving the standard briefing by the supervisor. Throughout the project individual telephone conversations were randomly monitored. In addition, each location had a supervisor who checked interviews and questionnaires and who was present to solve procedural problems as they arose. The local supervisor was also responsible for editing all completed questionnaires.

E. REPLACEMENT OF INTERVIEWS

Initially it was estimated that replacement of sample members would occur only when refusals were encountered. However, the primary sample contained a much larger number of incorrect or inadequate listings than was anticipated. Whereas the total refusal rate was only 10 percent[3] of the 2,945 firms actually contacted in the course of the study, another 13 percent of the sample had to be replaced for other reasons. Often the local telephone operators had no knowledge of the firm or its telephone number. Eleven percent of the total sample fell into that category.

In those instances where legitimate telephone numbers could be obtained at least six attempts were made to contact a firm before it was replaced. With some firms, particularly those in the construction industry, as many as 12 callbacks were made to secure the interview. A complete listing of refusals and other replacement reasons by SIC group will be found in table 3 below.

When it was necessary to replace an organization in the primary sample, the selection priorities were as follows:

1. Replace with a firm having the identical four-digit SIC number and size characteristics.
2. If the criteria in (1) could not be met, replace with a firm in the same SIC sample group (i.e., one of the 87 such groups) and of the same size category.
3. If the criteria in (2) could not be met, replace with a firm in the same SIC group, but differing in size.
4. If it was impossible to fulfill any of the above priorities, the firm was dropped from the sample.

In each replacement situation, if there were two or more replacement possibilities, the choice was made on a random basis.

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[3] Nine percent refused to cooperate on the initial contact, while one percent of the refusals occurred in attempting to secure the follow-up interview.

Table 3. Recount of Reasons for Replacing Sample Units

	Number
Total refusals	300
(On initial contact)	(266)
(On follow-up)	(34)
No listing of telephone	314
Duplicates	71
Other	64
Total	749

F. INTERVIEWING SCHEDULE

The performance periods for the three locations were as follows:

Washington, D.C.: August 17–October 14
Cedar Rapids: August 17–September 25
Denver: August 20–October 22

The necessity of cutting off the interviewing so that tabulation could begin resulted in the cancellation of 62 follow-up interviews for which initial contacts had been made.

G. CODING AND TABULATION

Although many of the questions were pre-coded by virtue of the fact that they required a simple yes-no choice, a number of questions were open-end and thus required the construction of coding categories. To attain that end 300 questionnaires were hand-tallied on the open-end questions. Similar responses were grouped and codes were developed.

Each section of the questionnaire was coded so it could be keypunched on one standard IBM card. The existence of two alternative forms for section II required the establishment of two codes and cards for that section. Therefore, although a total of five codes was developed, the responses to each questionnaire were contained on four cards.

All of the coding was done by individuals who had also conducted interviews. Each coder was assigned one section of the questionnaire to code. Prior to keypunching each questionnaire was checked for accuracy by the coding supervisor.

The tabulation of questionnaire responses was conducted by Control Data Corporation, utilizing its QUESTAIRE General Questionnaire Analysis System. Each question, in addition to its single tabulation, was cross-tabulated by (1) SIC sample group and (2) size of firm. Also, certain questions in Section IV were cross-tabulated by (1) suggested changeover time period and (2) gross sales.

H. RESULTS OF THE INTERVIEWING

The number of interviews, in which all four sections were completed, totaled 2,563. In addition, 11 contacts were made for which no follow-up interviews were conducted, as the sample cells for those SIC groups had already reached the quota. At the completion of the interviewing, 64 more contacts had been completed, for which no follow-up interviews were conducted.

The final number of full interviews obtained represented 90 percent of the primary sample of 2,868. However, contacts or attempted contacts were made with 3,559 firms.

All SIC sample groups were well represented in the final compilation (Table 4). The lowest representation in any sample group was 57 percent (Sample Group No. 10). Better than 80 percent representation was obtained in 72 of the 87 SIC groups.

The other sampling criterion, size of firm, was nearly identical in proportion to the sizes specified in the primary sample (table 5). A chi-square test indicated no statistically significant difference in levels of firm size between the primary and obtained samples.

Table 4. Completed Interviews—By SIC Sample Group

SIC sample group	Number in primary sample	Number of interviews obtained	Percentage of primary sample interviewed
No answer	0	8	—
1	90	70	77
2	33	29	88
3	27	19	70
4	32	23	72
5	30	29	97
6	31	27	87
7	31	29	94
8	46	41	89
9	30	35	117
10	30	17	57
11	30	30	100
12	36	31	86
13	33	31	94
14	32	27	84
15	36	30	83
16	41	32	78
17	31	28	90
18	30	27	90
19	30	27	90
20	30	30	100
21	30	33	110
22	30	26	87
23	30	28	93
24	30	24	80
25	31	27	87
26	30	25	83

Table 4. Completed Interviews—By SIC Sample Group—Continued

SIC sample group	Number in primary sample	Number of interviews obtained	Percentage of primary sample interviewed
27	63	64	102
28	30	31	103
29	33	30	91
30	31	30	97
31	30	28	93
32	34	32	94
33	33	28	85
34	30	29	97
35	31	29	94
36	41	34	83
37	39	39	100
38	32	27	84
39	32	28	88
40	32	30	94
41	30	30	100
42	31	27	87
43	32	26	81
44	31	35	113
45	30	28	93
46	33	30	91
47	30	28	93
48	30	31	103
49	32	30	94
50	31	30	97
51	32	34	106
52	30	22	73
53	34	31	91
54	39	33	85
55	30	34	113
56	30	28	93
57	31	29	94
58	31	35	113
59	34	32	94
60	34	30	88
61	30	22	73
62	15	10	67
63	32	30	94
64	31	26	84
65	30	31	103
66	26	19	73
67	41	37	90
68	41	26	63
69	29	27	93
70	26	24	92
71	31	31	100
72	30	24	80
73	33	29	88
74	24	24	100

Table 4. Completed Interviews—By SIC Sample Group—Continued

SIC sample group	Number in primary sample	Number of interviews obtained	Percentage of primary sample interviewed
75	24	23	96
76	34	25	74
77	30	24	80
78	29	21	72
79	43	26	60
80	30	21	70
81	32	31	97
82	35	26	74
83	33	31	94
84	34	32	94
85	35	31	89
86	31	31	100
87	40	43	108

Table 5. Completed Interviews—By Size of Firms

Size of firm	Number in primary sample		Number of interviews obtained	
	Number	Percent	Number	Percent
1–19	980	34.2	851	33.2
20–249	958	33.4	863	33.7
250 or More	910	31.8	849	33.1
No answer	16	0.6	....	....
Total	2,864	....	2,563	....

Appendix B

SUMMARY OF RESULTS

QUESTIONNAIRE SECTION I—INTRODUCTION AND IDENTIFICATION

Identification of Spokesman.—Questions were usually (82%) answered by high-level managers in all employer size groups.

Previous Knowledge of Metric.—Three quarters of the respondents had heard or read something about possible metric conversion before contacted, but more large companies had heard of it than small ones. Those in Utilities, Wholesale Trade, Real Estate, and Communication were most often informed, those in Agriculture least frequently aware of possible changeover; news about metrication had come most often through the newspapers and trade journals; TV and radio were hardly mentioned.

Explanation of Metric System.—Nearly ¾ of the population gave an adequate definition of the metric system before receiving any information on the subject; Large company spokesmen were most knowledgeable, more small company spokesmen said "Don't Know".

Prior Use of Metric.—Over half of those interviewed had used the metric system at some time; more large firm spokesmen than small had used it; the metric system had been most frequently used in school, at work, and in foreign travel.

Attitude Toward Metric.—When asked about advantages and disadvantages of the metric system before receiving any materials, spokesmen said that the greatest advantage to metric measurement was its ease of use; the greatest disadvantage, the expense and difficulty of conversion to a new system; 51 percent of the total sample of respondents indicated no particular concern at the prospect of national adoption of the metric system; 33 percent mentioned some adverse aspect of conversion.

QUESTIONNAIRE SECTION II—CURRENT USE OF MEASUREMENT SYSTEMS IN COMPANY OUTPUTS

Current Usage of Metric Measurements in Outputs.—Questionnaire Form A—product-related firms; Questionnaire Form B—service-related firms. Seventy-four percent of all respondents listed a service as one of their organization's major activities; 40 percent listed a product-related activity; some listed both.

Use of Measurement Units in Sales Activities.—Prices are more frequently quoted on length, area or volume (53%) than on weight, temperature or thermal content (36%); the Construction industry dealt most frequently with length, area or volume; Mining most often with weight, temperature or thermal content; Finance and Insurance rarely quoted prices for any type of physical dimension.

Metric Measurements in Sales Activities.—About 8 percent of the firms interviewed already made some use of metric measurements to describe products or quote prices; about 1 percent used metric in all their sales-related measurements; length/weight/volume were more often measured metrically than temperature; Wholesale Trade, Transportation, Retail Trade, Forestry/Fisheries, and Mining most often indicated use of metric measurements in sales; Communications was the only industry with *no* use of the metric system in this area.

Metric Engineering Standards in Sales.—Some use of metric engineering standards, either alone or in combination with U.S. standards, occurred in connection with selling products—about 11 percent of the respondents claimed this kind of metric usage; Utilities was the only industry making appreciable use of metric standards (16%); 6 percent of the Mining industry said both U.S. and metric standards were used.

Packaging.—Packages are rarely described in metric units alone, but 7 percent of the sample labeled packages with both U.S. and metric units.

Foreign Licensees/Subsidiaries.—Firms with foreign licensees or subsidiaries (12% total sample) said they usually used the measurement system of the country in which those auxiliaries were located—occasionally some units produced abroad were mixed U.S. and metric dimensions. In general, measurement considerations had no effect on the decisions to operate licensees or subsidiaries in foreign countries.

Imports to U.S.—The majority thought that the sales of foreign goods in the U.S. were not affected by the measurement system used in production; only 12 percent felt sales of imported goods had been affected; Wholesale and Retail Trade had the highest percentages which felt sales of foreign goods had *not* been affected by measurement units or standards used.

Exports.—About 11 percent of the respondent organizations exported goods to foreign countries; the Wholesale Trade, Mining, Agriculture and Forestry/Fisheries industries most frequently reported such commerce.

Measurement Units Used by Exporters.—The majority of the exporters used U.S. measurement units to describe their goods but about 32 percent of the exporter group used metric measurement at least part of the time; large exporting firms accommodated to foreign measurements more often than small ones did; the industry groups that least often changed units for exports were Agriculture and Retail Trade. Mining and Wholesale Trade most often changed at least part of the time. A majority of firms that changed units for exports reported no problems in changing measurement descriptions; but most did convert the measurements rather than using both systems simultaneously. Only 9 percent of the exporters felt that their volume of export sales was affected by the measurement units used to describe products.

Engineering Standards for Exports.—Of the exporters, about 16 percent used different engineering standards for goods sent abroad but the majority used U.S. standards—sometimes changing the descriptive terminology. The chief reasons for changing the dimension descriptors were that the destination country required it and customers there disliked having to make their own conversions; competition with locally produced goods was easier if the measurements were in metric units. About 6 percent of the exporters said they felt their export sales were affected by the engineering standards used.

Foreign Competition in U.S.—About half of the product-related companies said their U.S. markets were shared by foreign firms; this foreign competition was acknowledged by more large companies than small; organizations in the distributive industries most often said they were affected. A majority of imported goods were said not to conform to U.S. measurement units and/or standards but were those used in the country of origin.

QUESTIONNAIRE SECTION III—CURRENT USE OF MEASUREMENT SYSTEMS IN COMPANY INPUTS

Use of Metric-Described Items.—Sixteen percent of the sample population said they were making significant use of equipment, supplies or components described in metric units; more large than small or medium firms used such items; over twice as many of these items were labeled in metric units only as were described in both systems; Forestry/Fisheries, Services, Utilities, Communication, Wholesale Trade, and Mining were the largest users of such items. More than 89 percent of all firms which used any metric-described item used at least one item classified as equipment.

Use of Metric-Designed Items.—Seven percent of the total population said they used equipment, tools, components or supplies which were designed to metric engineering standards—again largest firms were more likely to use metric-designed items; Forestry/Fisheries, Mining, and Services made greatest use of those equipment, supplies, or components.

Sources of Metric Goods.—Of those companies (17% of sample) using metric-described and/or metric-designed goods in company operations, 28 percent said such items were manufactured in the U.S., 25 percent imported them and 15 percent bought them in both markets. Advantages listed for the use of these metric-described/designed articles were concerned with the convenience of the measurement system itself—easier to use, etc.,—but disadvantages were pointed at the difficulties of adopting the system—conversion, obtaining parts, educating employees, etc.; nearly twice as many users of "metric" articles cited advantages as cited disadvantages.

Measurement as a Tool.—Measurement as a tool in their businesses was rated as more important by large organizations than small and was given priority rating by Construction, Real Estate, and Utilities.

Present Usage of Metric.—About 20 percent of the total sample said the metric system was used "sometimes" in company operations but only 0.4 percent of all respondents used the metric system in all measurement operations. Twenty-three percent of large companies, 15 percent of medium companies, and 13 percent of small companies used "some" metric measurements in doing business. Communications and Forestry/Fisheries used metric most often (32% and 26%).

QUESTIONNAIRE SECTION IV—FUTURE MEASUREMENT

Voluntary Increase in Metric Usage.—Not many industries expected to increase their usage of metric measurement "on their own"—about 6 percent said they expected to; about 10 percent more added that they would if the whole U.S. did; Forestry/Fisheries, Wholesale Trade, and Communication had more firms with this intention; about 6 percent of the total sample said they expected to increase use of metric measurement "on their own" whether the rest of the country did or not. Special interest groups which were, perhaps, closer to foreign trade had significantly higher percentages of establishments intending to increase their own usage of metric measurement—exporters 12 percent; having foreign licensees or subsidiaries 13 percent; and currently using metric-described/designed goods or equipment 17 percent.

Why Increase "On Own."—The 6% thought that increased metric usage would imprope the quality of their outputs, ease international commerce and (for a very few) help meet foreign competition.

Why Not Increase "On Own".—Of the reasons given for no voluntarily increased usage of metric measurement given by 83 percent of the total sample, about 41 percent had to do with relationships with others—industry standards, government requirements, no customer demand, suppliers determine it, etc.; less than 9 percent were concerned with the organization's own determinations—do not wish to change our equipment, too difficult to change, etc.

If Suppliers Increase Metric.—More than 75 percent of the total sample said "Don't Know" or "No Answer" when asked how they would be affected if suppliers increased their use of metric descriptions or standards.

Inventory Problems.—If possible conversion to the metric system were on a voluntary, industry-wide basis, relatively few spokesmen (36%) said they would expect inventory problems; More spokesmen in the Utilities (67%), Wholesale Trade (50%) and Forestry/Fisheries (47%) firms anticipated inventory problems; nearly twice as many large firms as small said they would expect problems.

Possible Government Action.—A second possible method of national conversion to the metric system is through government action; 50 percent favored government action, 37 percent no government action, and 13 percent said "Don't Know/No Answer." The Agriculture and Construction industries were least often in favor of government action. More large firms (59%) favored government action than medium (50%) or small (40%); of those who favored government action, 45 percent preferred a "mandatory national program;" 38 percent suggested a national educational program.

Assume a National Program.—Respondents had received via mail a list of 8 characteristics that might guide a possible national metrication program; these assumptions formed the basis for the following answers:

National Time Period.—When asked to suggest a "reasonable" time period for a planned national program of metrication, a 6 to 10 year conversion program was said to be the most satisfactory period by 42 percent of all respondents; About 70 percent of the population named a time period of 10 years or less; Differences between different sized companies were small; Majorities in every industry suggested a time period of 10 years or less.

Industry Time Period.—For a "reasonable" time period for a changeover within their own industries, respondents mostly suggested a time period shorter than the 6 to 10 years specified for the nation; more small and medium sized organizations than large ones suggested time periods of "immediately" and "1–2 Years"; the response for a changeover within their own industry as suggested by the greatest percentages in each industry:

Immediately	Percent of indus.	1–2 Years	Percent of indus.	3–5 Years	Percent of indus.	6–10 Years	Percent of indus.
Finance	46	Forestry/Fisheries	29	Communication	28	Utilities	31
Insurance	45	Transportation	22	Construction	25	Wholesale Trade	21
Agriculture	41	Communication	28				
Services	40	Construction	25				
Real Estate	34						
Forestry/ Fisheries	32						
Retail Trade	29						
Transportation	22						

(See discussion for Q. IV—9 or Tables 89A, B, C for full details.)

Never!—Less than 3 percent said the country should never change its measurement system; About 3 percent of every industry *except* Forestry/Fisheries, Communications, Utilities, and Real Estate gave this response.

Advantages to Change.—About half of all respondents were unable to suggest any advantages to their organizations if metrication were to take place during the time period they had suggested; more large firms than small or medium were able to suggest advantages; but the response categories were too scattered to permit definitive restatement here.

Disadvantages to Change.—General conversion expense and retraining of employees were the disadvantages most often listed for change to the metric system, with large companies mentioning them more often than small ones; about 45 percent of the sample population could cite no disadvantage to a changeover which would take place during the time period they had suggested; Construction listed "general conversion" and "retraining" most often.

U.S. Competition.—Over 92 percent of all respondents thought that conversion to metric would have no effect on their position relative to their U.S. competitors; of the 3 percent who saw their competitive positions affected, the effects mentioned were unfavorable; small and medium sized firms mentioned that smaller organizations would be hurt more often than large firms.

Effect on $ Sales.—Of those who thought the 10-year changeover period might affect their annual dollar sales (6%), most expected the change to increase their sales by from 0.5 to 25 percent; small employers more often expected to gain by conversion than large organizations did; more representatives within Wholesale Trade (10%) and Retail Trade (7%) thought their annual dollar sales would be affected.

Effect on Export Sales.—Less than 1 percent of all those surveyed, (but about 9% of the exporters), thought annual export sales would be affected by a 10-year metrication program; most expected increases; Wholesale Trade and Services most often expected increased export sales.

Effect on Costs.—Fifty six percent of the total sample expected *no* change in costs of operation as a result of a 10-year planned changeover time; many more large firms (50%) did expect a change in costs than medium (41%) or small firms (28%); Industry groups in which majorities of firms expected costs to change were Utilities (61%), Wholesale Trade (53%), and Mining (52%). Of those who did expect an increase in costs, 62 percent expected costs to increase, 5 percent expected costs to decrease, and more than 30 percent could state neither the direction nor the magnitude of anticipated change. In terms of the total sample of firms, 24 percent expected increased costs, 2 percent expected decreased costs, 13 percent expected costs to change but could not state magnitude or direction, and 56 percent thought that costs would not be affected by a nationally planned 10-year changeover.

Expected Percent Increase in Costs.—About half of those who predicted that costs would increase with nationally planned metrication said that the increase would amount to between 0.5 percent and 5 percent of their annual dollar costs spread over a number of years; only about 7 percent said the change in costs would affect their companies more than 10 years. About 18 percent of those who expected an increase in costs, predicted an increase of 10 percent or more of their annual dollar costs spread over a number of years. Most respondents said the effect would last 8–10 years. Only those respondents who expected an increase of more than 25 percent of annual costs had appreciable numbers who expected the effect to extend more than 10 years.

Reason for Cost Changes.—"Labor" was named most frequently as the reason for increased *or* decreased costs associated with conversion. Construction anticipated the most problem with labor costs. Among organizations with less than $1 billion in annual sales, it was most frequently anticipated that *labor* would be the chief factor in any change in costs due to metrication; in companies with over $1 billion in sales, *equipment* was more often named as the source of greatest expense.

Costs by Industry.—Those industries in which respondents most frequently anticipated a change in costs with a nationally planned 10-year changeover were Utilities, Wholesale Trade, Mining and Construction. *Of those predicting a change in costs*: Those with highest percentages predicting increases in costs were Communication, Utilities, Construction, Wholesale Trade, and Mining; those with the highest percentages predicting decreases in costs were Insurance, Real Estate, Wholesale Trade, Utilities, and Services. In all industries except Insurance, more than one quarter of those who expected costs to change could not predict the magnitude or direction of the change.

Costs to be Passed on by a Few.—More large firms would probably add any conversion costs to their selling prices than would small companies; but in every industry a decided majority said changeover would have no effect on the selling prices of their goods; only about half as many firms expected to change their selling prices as expected costs would change either up or down. Should a rise in selling price occur, a majority of those expecting one thought it probably would be no higher than any increase in their operating costs (0.5 percent yer year during the period of changeover). Utilities, Construction, Wholesale Trade and Forestry/Fisheries most often expected to pass any increased costs on to the consumer.

Retraining.—More large employers expected to have to retrain some employees than did small firms:

Size of firm	Percent expecting to retrain
Small or 1–19 employees	49
Medium or 20–249	63
Large or 250+	70
Total	61

In only Finance, Agriculture and Communications did majorities *not* expect to have to do retraining.

Percent Employees Retrained.—Of those who said some retraining would be necessary, estimates of percentages of employees needing retraining ranged from less than 1 percent to 100 percent; with large firms estimating smaller percentages generally and smaller firms estimating higher percentages. The Wholesale Trade, Retail Trade, Transportation, and Utilities industries had the highest percentages of firms expecting to retrain *all* employees. More Finance and Agriculture and Communications predicted *no* retraining.

Cost of Retraining.—Estimates of probable cost to retrain an employee ranged from $1 to over $1,000 but 56 percent said they really didn't have any idea. Those willing to complete the conversion program in the shortest periods of time apparently expected to have to do the least retraining.

Attitudes Toward Increased Metric Usage.—Company attitudes toward increased metric usage in company operations were:

	Percent of total sample
Strongly for	13
Mildly for	17
Neutral	43
Mildly against	12
Strongly against	14
Don't Know/No Answer	0.7

Those in the "Neutral" category frequently indicated that although they knew costs would be involved in converting to metric measurement, they were not willing to stand against a trend that might possibly improve economic position. Spokesmen for Construction and Agriculture had the only pluralities opposed to change within their own operations:

	For	Against
Construction	24	37
Agriculture	23	28

Attitudes of Special Subgroups.—Exporters, owners of Foreign licensees/subsidiaries, and current users of metric-described/designed equipment, supplies or components were all more favorable toward use of metric in their own operations than was the total population:

Group	Percent strongly or mildly for increased metric usage in company operations
Total population	30
Exporters	38
Licensees/subsidiaries	36
Current metric users	53

Metric Measurement for the Nation.—A substantial majority of the sample said they thought increased usage of metric measurement was in the best national interest:

	Employer Size:			
	Small	Medium	Large	Total
In best interests of U.S	52	61	72	61
Not in best interests	27	23	15	22
Don't Know/No Answer	20	16	12	16

A majority in *all* industries supported the idea that metrication was best for the nation as a whole. Again the special subpopulation groups expressed the total population opinion with greater intensity:

Group	Percent believing increased metric usage in best interests of U.S.
Total population	61
Exporters	70
Licensees/subsidiaries	74
Current metric users	79

If national conversion to the metric system were found to be in the best interests of the county, the kind of changeover programs preferred would be:

	Employer size:			
	Small	Medium	Large	Total
Mandatory national	57	63	67	62
Voluntary national	23	24	26	24
Voluntary only, no national program	12	7	4	8

All industries had a majority in favor of a mandatory national program.

In Summary.—A majority of the nonmanufacturing industries spokesmen whose answers have been analyzed in this report have said: conversion to the use of metric measurement would cost us something and be enough inconvenience that we won't change unless the whole country does. But—we believe such a change is in the best interests of the nation and we will go along with it, but everybody should make the conversion and that means a coordinated national program, preferably "mandatory."

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16. ABSTRACT (A 200-word or less factual summary of most significant information. If document includes a significant bibliography or literature survey, mention it here.)

This publication, prepared pursuant to the U.S. Metric Study Act, reports on the experiences and views of non-manufacturing businesses with regard to metric usage and its increase. The study is based on a survey of more than 2500 companies and firms primarily involved in: agriculture, forestry, fisheries, mining, construction, transportation, communications, utilities, wholesale/retail trade (including exporters/importers), finance, insurance, real estate or services. Information was obtained on: past or present experience with use of the metric system (including perceived advantages and disadvantages thereof), attitudes toward future metrication in a world of increasing metric usage (including preferred U.S. policy regarding), and estimated cost impacts and benefits which would be attendant to a national metrication program.

17. KEY WORDS (Alphabetical order, separated by semicolons) International System of Units; metric conversion; metric system; metric usage; metrication; metrication, attitudes toward; metrication, costs and benefits of; metrication, impact of; nonmanufacturing businesses; SI; U.S. Metric Study

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